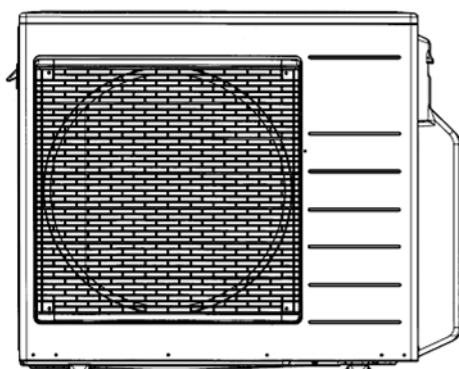


Service Manual

Air Conditioner

Outdoor Unit
CU-2S18NBU-1



Please file and use this manual together with the service manual for Model No. CS-S9NKUW-1, CS-S12NKUW-1 Order No. PHAAM1111084C1

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigeration circuit.

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1. Safety Precautions







- Read the following "SAFETY PRECAUTIONS" carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

 WARNING	This indication shows the possibility of causing death or serious injury.
 CAUTION	This indication shows the possibility of causing injury or damage to properties.


- The items to be followed are classified by the symbols:

	This symbol denotes item that is PROHIBITED from doing.
---	---







- Carry out test running to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

 WARNING	
1.	Do not modify the machine, part, material during repairing service.
2.	If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.
3.	Do not wrench the fasten terminal. Pull it out or insert it straightly.
4.	Engage authorized dealer or specialist for installation and servicing. If installation or servicing done by the user is defective, it will cause water leakage, electrical shock or fire.
5.	Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.
6.	Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.
7.	Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.
8.	For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.
9.	This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.
10.	Do not use joint cable for indoor / outdoor connection cable. Use specified indoor / outdoor connection cable, refer to Installation Instructions CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor / outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.
11.	Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at the connection point of terminal, fire or electrical shock.
12.	When install or relocate air conditioner, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigerant cycle (piping). (Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).
13.	Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.
14.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case equipment breakdown or insulation breakdown. 
15.	Keep away from small children, the thin film may cling to nose and mouth and prevent breathing. 
16.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire. 
17.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage. 
18.	For R410A models, when connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A materials. Thickness of copper pipes used with R410A must be more than 0.8mm (1/32"). Never use copper pipes thinner than 0.8mm (1/32"). It is desirable that the amount of residual oil is less than 40 mg/10m (0.0008 oz/ft). 
19.	During installation, install the refrigerant piping properly before run the compressor. (Operation of compressor without fixing refrigeration piping and valves at opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).

WARNING

20.	During pump down operation, stop the compressor before remove the refrigeration piping. (Removal of refrigeration piping while compressor is operating and valves are opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.).	
21.	After completion of installation or service, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.	
22.	Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when the refrigerant contacts with fire.	
23.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.	
24.	Must not use other parts except original parts describe in catalog and manual.	
25.	Using of refrigerant other than the specified type may cause product damage, burst and injury etc.	

CAUTION

1.	Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.	
2.	Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.	
3.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.	
4.	Do not touch outdoor unit air inlet and aluminium fin. It may cause injury.	
5.	Select an installation location which is easy for maintenance.	
6.	Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F – 70°F (30°C – 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).	
7.	Power supply connection to the air conditioner. Power supply cord shall be UL listed or CSA approved 4 conductors with minimum AWG12 wires. Power supply point should be in an easily accessible place for power disconnection in case of emergency. In some countries, permanent connection of this air conditioner to the power supply is prohibited. Fix power supply connection to a circuit breaker for the permanent connection. Use NRTL approved fuse or circuit breaker (rating refers to name plate) for the permanent connection.	
8.	Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite.	
9.	Installation or servicing work: It may need two people to carry out the installation or servicing work.	
10.	Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.	
11.	Do not sit or step on the unit, you may fall down accidentally.	
12.	Do not touch the sharp aluminum fin, sharp parts may cause injury.	

2. Specification

Model			Outdoor Unit	CU-2S18NBU-1	
Indoor Unit Combination				3.2kW + 3.2kW	
Power Source				1 Phase, 208-230V, 60Hz (Power supply from outdoor unit)	
Cooling Operation	Capacity		kW	4.89 (2.10 ~ 5.86)	
			BTU/h	16700 (7200 ~ 20000)	
	Electrical Data	Running Current	A	7.6 - 6.9	
		Power Input	kW	1.45 (0.39 ~ 1.84)	
		EER	W/W	3.37 (5.38 ~ 3.18)	
			BTU/hW	11.50 (18.45 ~ 10.85)	
	Noise	Sound Pressure Level	dB-A	48	
		Sound Power Level	dB	62	
Maximum Current			A	13.6	
Starting Current			A	7.8	
Minimum Circuit Ampacity			A	20	
Dimension	Height		mm (inch)	795 (31-5/16)	
	Width		mm (inch)	875 + 95 (34-15/32 + 3-3/4)	
	Depth		mm (inch)	320 (12-5/8)	
Net Weight			kg (lb)	69 (152)	
Connection Cable				3 + 1 (Earth) ø1.5 mm ²	
Pipe Length Range (1 room)			m (ft)	3 ~ 25 (9.8 ~ 82.0)	
Maximum Pipe Length (Total Room)			m (ft)	50 (164.0)	
Refrigerant Pipe Diameter	Liquid Side		mm (inch)	6.35 (1/4)	
	Gas Side		mm (inch)	9.52 (3/8)	
Compressor	Type			Hermetic (Rotary)	
	Motor Type			DC Brushless (4-poles)	
	Rated Output		W	1.30k	
Air Circulation	Type			Propeller Fan	
	Motor Type			DC Brushless (8-poles)	
	Rated Output		W	60	
Fan Speed	High		RPM	650	
Heat Exchanger	Type			Plate fin configuration forced draft type	
	Tube Material			Copper	
	Fin Material			Aluminum	
	Row/Stage			2/36	
	FPI			19	
Air Volume	High		m ³ /min (ft ³ /min)	37.2 (1313)	
Refrigerant Control Device				Expansion Valve	
Refrigerant Oil				FV50S	
Refrigerant (R410A)			g (oz)	1.92k (67.8)	
				Dry Bulb	Wet Bulb
Indoor Operation Range	Cooling	Maximum	°F	89.6	73.4
		Minimum	°F	60.8	51.8
Outdoor Operation Range	Cooling	Maximum	°F	109.4	78.8
		Minimum	°F	60.8	51.8

Note

- Specifications are subject to change without notice for further improvement.

- **Multi split combination possibility:**

- A single outdoor unit enables air conditioning of up to two separate rooms for CU-2S18NBU-1.

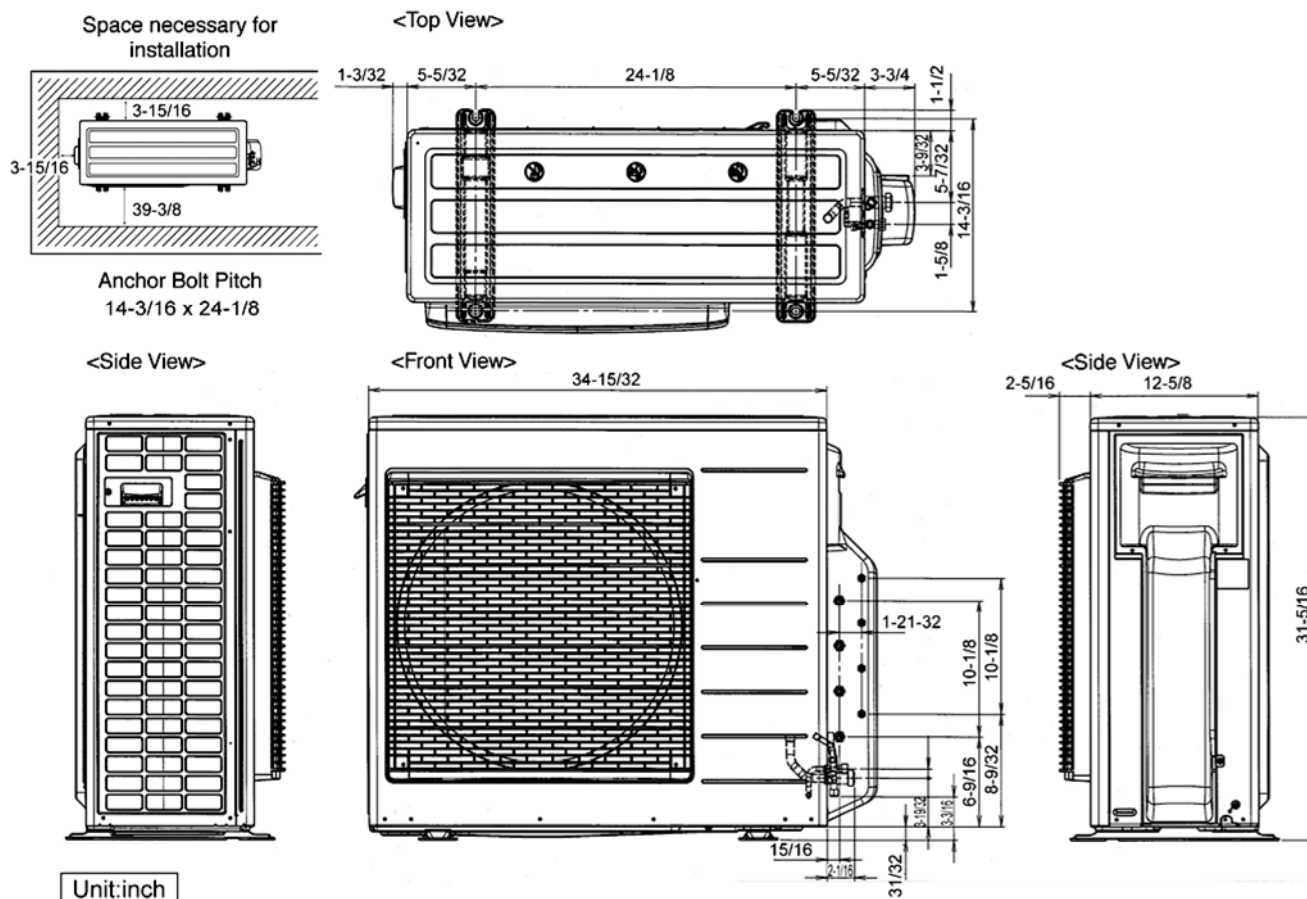
			Outdoor Unit	
			CU-2S18NBU-1	
			A	B
Wall	2.8 kW	CS-S9NKUW-1	●	●
	3.2 kW	CS-S12NKUW-1	●	●
Capacity range of connectable indoor units		From 5.6 kW to 6.4 kW		
Piping Length	1 room maximum pipe length (m (ft))	25 (82.0)		
	Allowable elevation (m (ft))	15 (49.2)		
	Total allowable pipe length (m (ft))	50 (164.0)		
	Total pipe length for maximum chargeless length (m (ft))	20 (65.6)		
	Additional gas amount over chargeless length (g/m (oz/ft))	20 (0.2)		
		Note: “●” : Available		
Remarks for CU-2S18NBU-1				
1. At least two indoor units must be connected.				
2. The total nominal cooling capacity of indoor unit that will be connected to outdoor unit must be within connectable capacity range of indoor unit. (as shown in the table above) Example: The indoor units' combination below is possible to connect to CU-2S18NBU-1. (Total nominal capacity of indoor units is between 5.6 kW to 6.4 kW) 1) Two CS-S9NKUW-1 only. (Total nominal cooling capacity is 5.6 kW) 2) One CS-S9NKUW-1 and one CS-S12NKUW-1. (Total nominal cooling capacity is 6.0 kW)				

Outdoor Unit	Indoor unit combination		Operation Mode	Capacity (kW)		Input Power (W)		Current (A) 208V 60Hz	Current (A) 230V 60Hz	Moisture Removal Volume (L/h)
	Operation	Class (kW)		Rating	Min - Max	Rating	Min - Max			
CU-2S18NBU-1	One-room Operation	2.8	Cooling	2.82	1.81 ~ 3.27	850	390 ~ 1020	4.5	4.1	0.5
		3.2		3.21	1.85 ~ 3.75	1000	390 ~ 1230	5.2	4.7	0.6
	Two-room Operation	2.8 + 2.8	Cooling	4.89	2.09 ~ 5.86	1450	390 ~ 1920	7.6	6.9	0.5 + 0.5
		2.8 + 3.2		4.89	2.10 ~ 5.86	1450	390 ~ 1870	7.6	6.9	0.5 + 0.6
		3.2 + 3.2		4.89	2.10 ~ 5.86	1450	390 ~ 1840	7.6	6.9	0.6 + 0.6

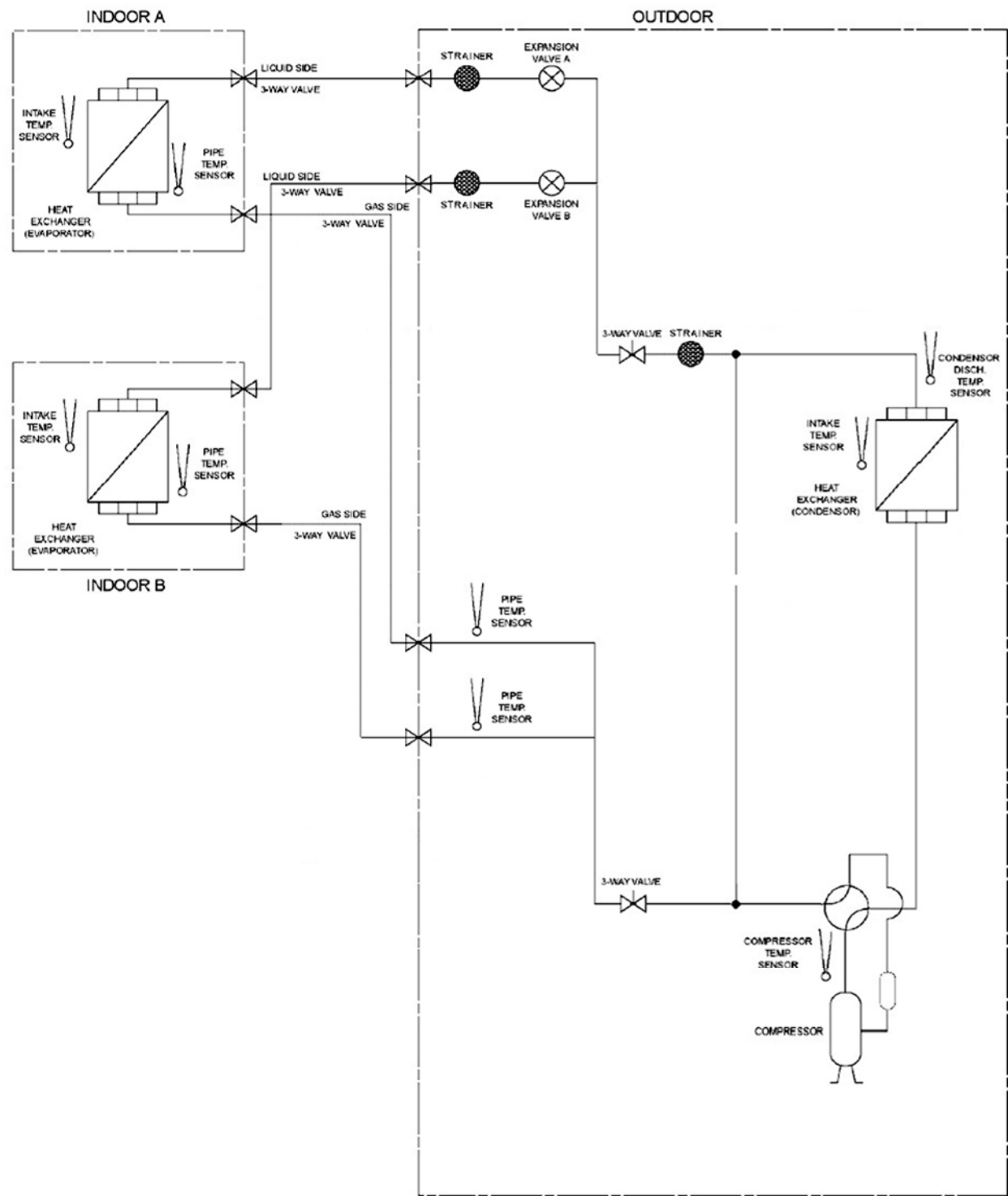
Outdoor Unit	Indoor unit combination		Operation Mode	Capacity (BTU/h)		Input Power (W)		Current (A) 208V 60Hz	Current (A) 230V 60Hz	Moisture Removal Volume (Pt/h)
	Operation	Class (kW)		Rating	Min - Max	Rating	Min - Max			
CU-2S18NBU-1	One-room Operation	2.8	Cooling	9600	6200 ~ 11200	850	390 ~ 1020	4.5	4.1	1.1
		3.2		10900	6300 ~ 12800	1000	390 ~ 1230	5.2	4.7	1.3
	Two-room Operation	2.8 + 2.8	Cooling	16700	7100 ~ 20000	1450	390 ~ 1920	7.6	6.9	1.1 + 1.1
		2.8 + 3.2		16700	7200 ~ 20000	1450	390 ~ 1870	7.6	6.9	1.1 + 1.3
		3.2 + 3.2		16700	7200 ~ 20000	1450	390 ~ 1840	7.6	6.9	1.3 + 1.3

- Specifications are subject to change without notice for further improvement.

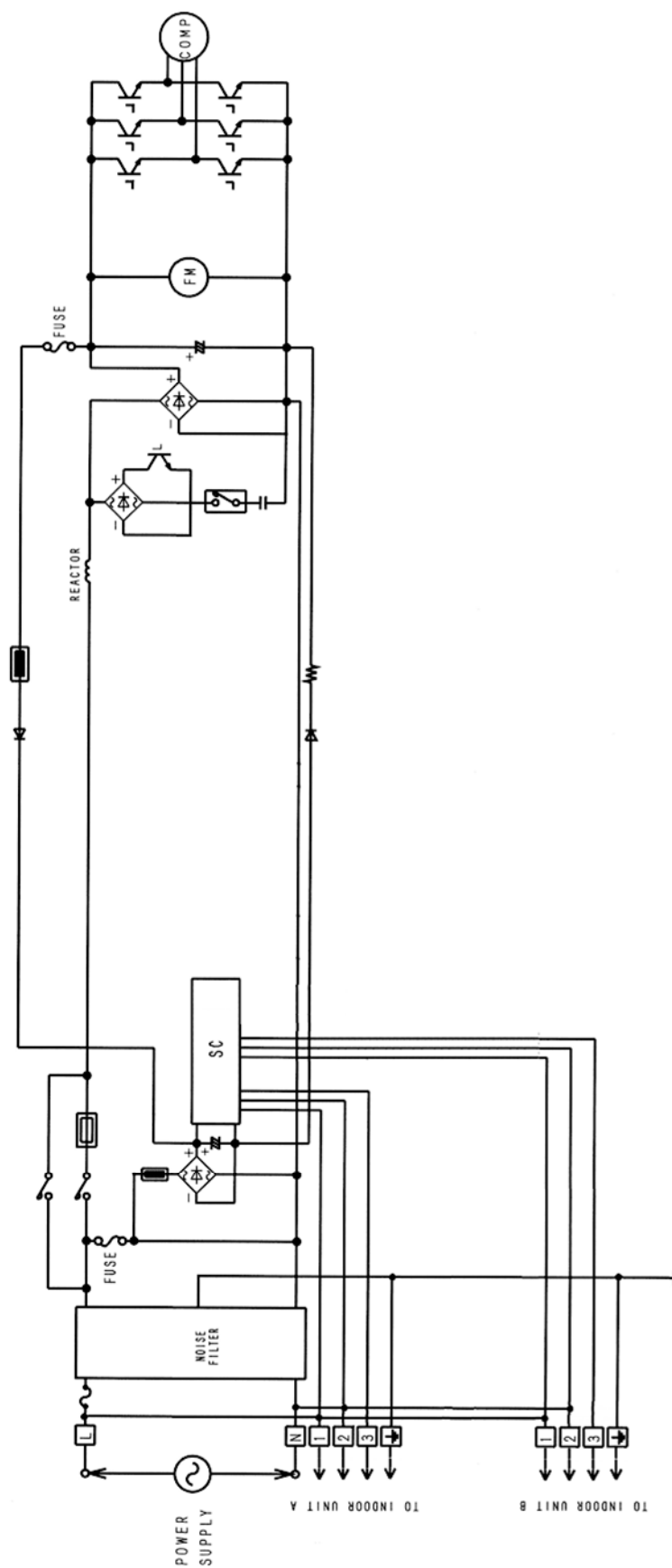
3. Dimensions



4. Refrigeration Cycle Diagram



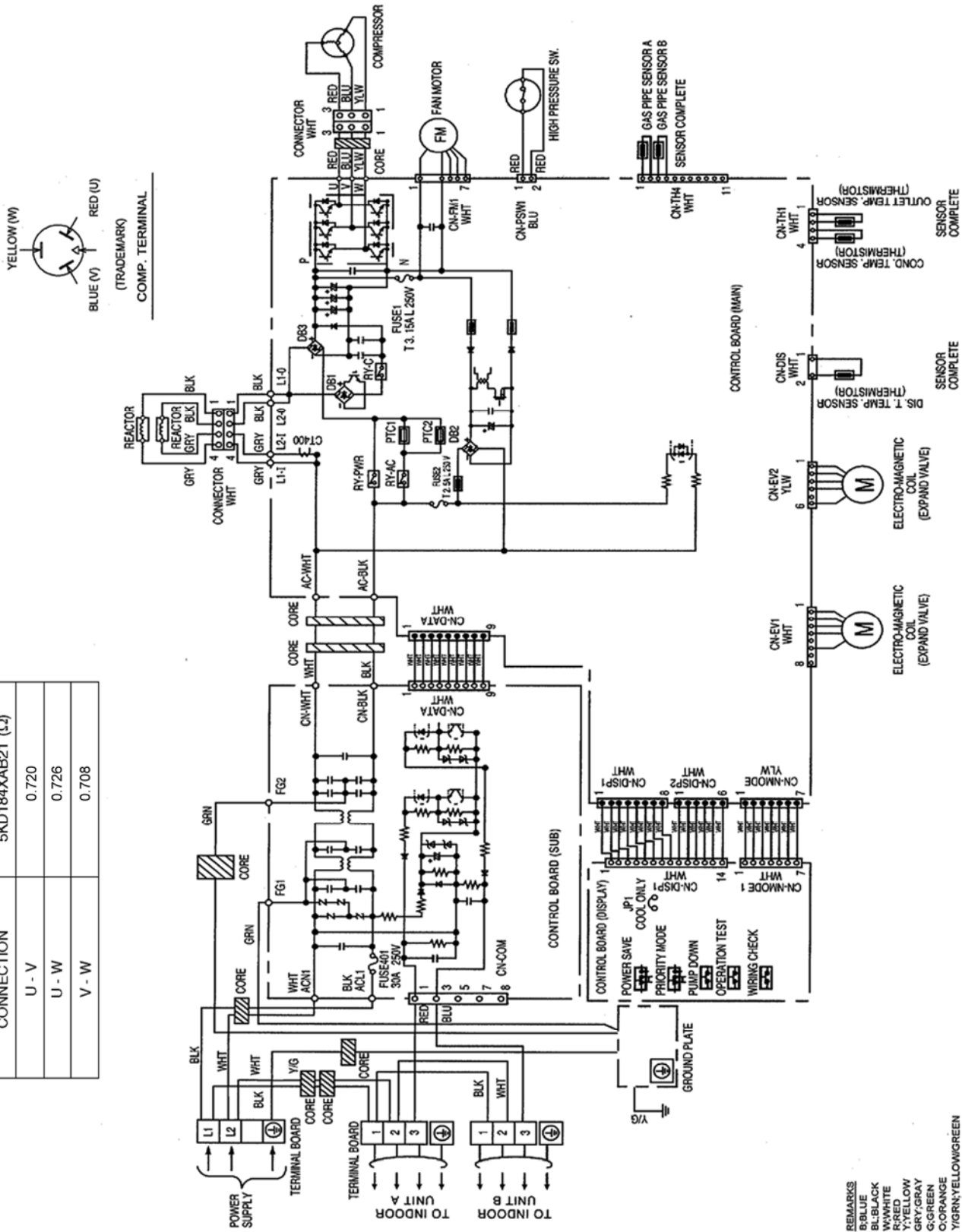
5. Block Diagram



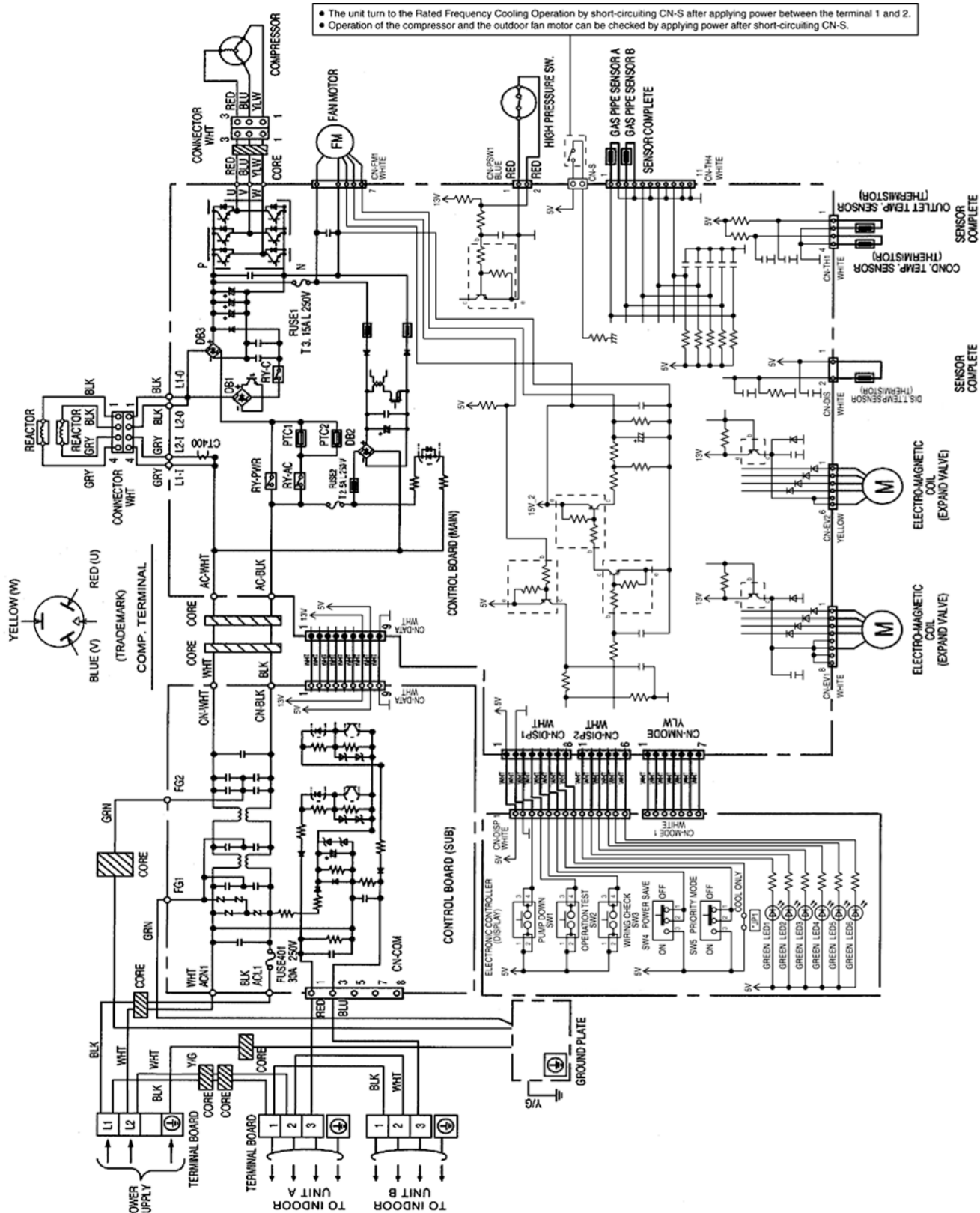
6. Wiring Connection Diagram

Resistance of Compressor Windings

CONNECTION	5KD184XAB21 (Ω)
U - V	0.720
U - W	0.726
V - W	0.708



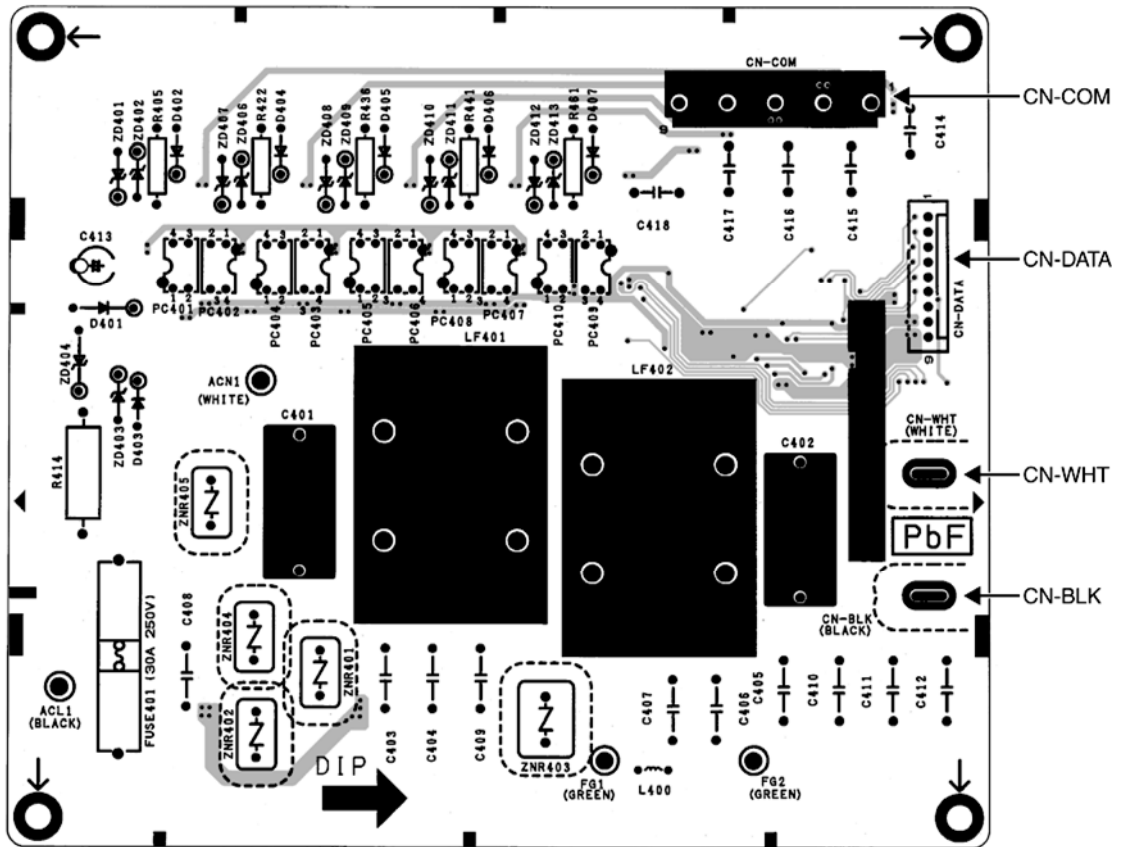
7. Electronic Circuit Diagram



8.1 Main Printed Circuit Board

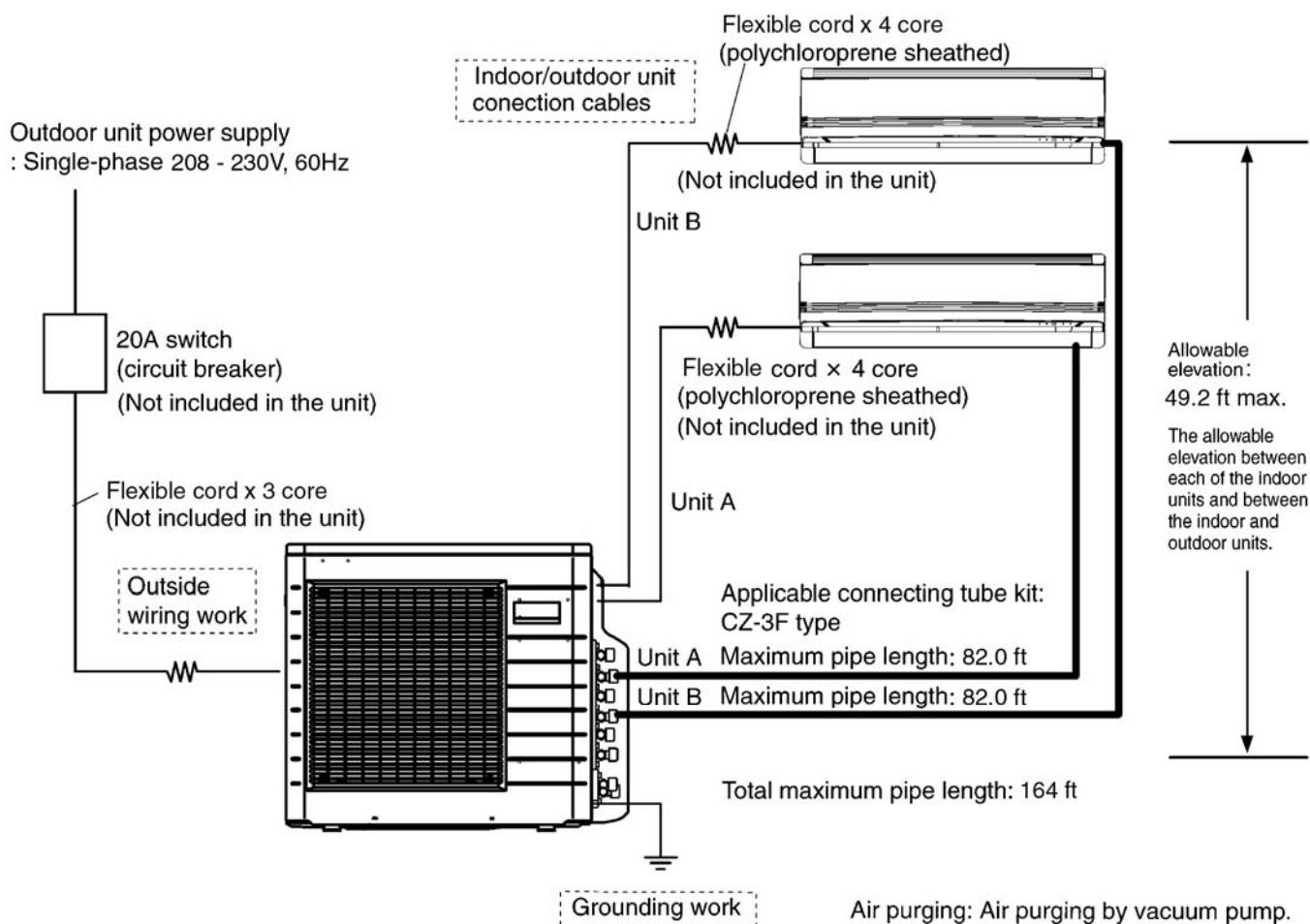


8.2 Noise Filter Printed Circuit Board



9. Installation Information

9.1 Check Points



QUICK GUIDE

PIPING & ELECTRICAL SPECIFICATION

Indoor(ID) & Outdoor(OD) units: Possible Combination Patterns	Capacity (Btu/h)	Refrigerant	Piping size		Standard pipe length	Max. Elevation	Min. pipe length for each ID unit	Max. from OD to each ID	Max. total length	Min. total pipe length for additional gas	Additional refrigerant	Power supply	Power supply wire size	OD-ID connection wire size
			Gas	Liquid										
Outdoor (OD): CU-2S18NBU-1 Indoor (ID): 2 UNITS OF CS-S9NKUW-1	16700	R410A	ø3/8" (ø9.52mm)	ø1/4" (ø6.35mm)	24.6 ft	49.2 ft	9.8 ft	82.0 ft	164.0 ft	65.6 ft	0.2 oz / ft	208/230V 60 Hz MCA 20A MOP 25A	AWG12	AWG16
Outdoor (OD): CU-2S18NBU-1 Indoor (ID): 2 UNITS OF CS-S12NKUW-1														
Outdoor (OD): CU-2S18NBU-1 Indoor (ID): 1 UNIT OF CS-S9NKUW-1 + 1 UNIT OF CS-S12NKUW-1														

Example:

If total piping length of all installed indoor units is at 68.6 ft, the quantity of additional refrigerant should be 0.6 oz (68.6 – 65.6) ft x 0.2 oz/ ft = 0.6 oz.

10. Installation Instruction

10.1 SELECT THE BEST LOCATION

10.1.1 OUTDOOR UNIT

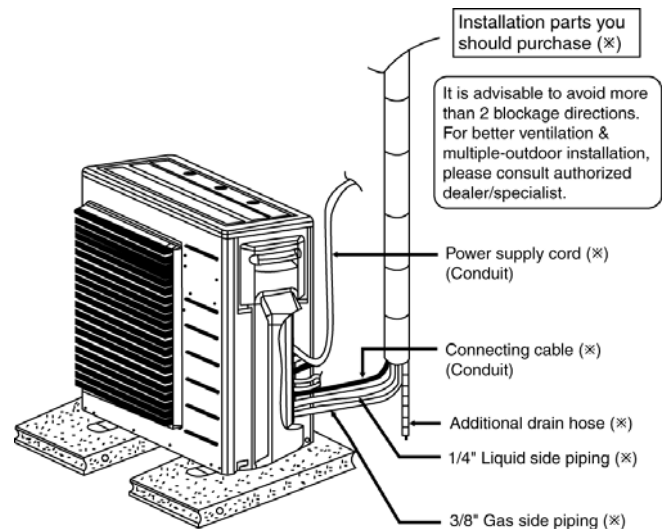
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- Recommended installation height for outdoor unit should be above the seasonal snow level.

Refrigerant piping size	
Outdoor Unit	CU-2S18***
Liquid - side	ø1/4" thickness 1/32"
Gas - side	ø3/8" thickness 1/32"

Outdoor Unit	CU-2S18***
Min. total piping length for additional gas	65.6 ft

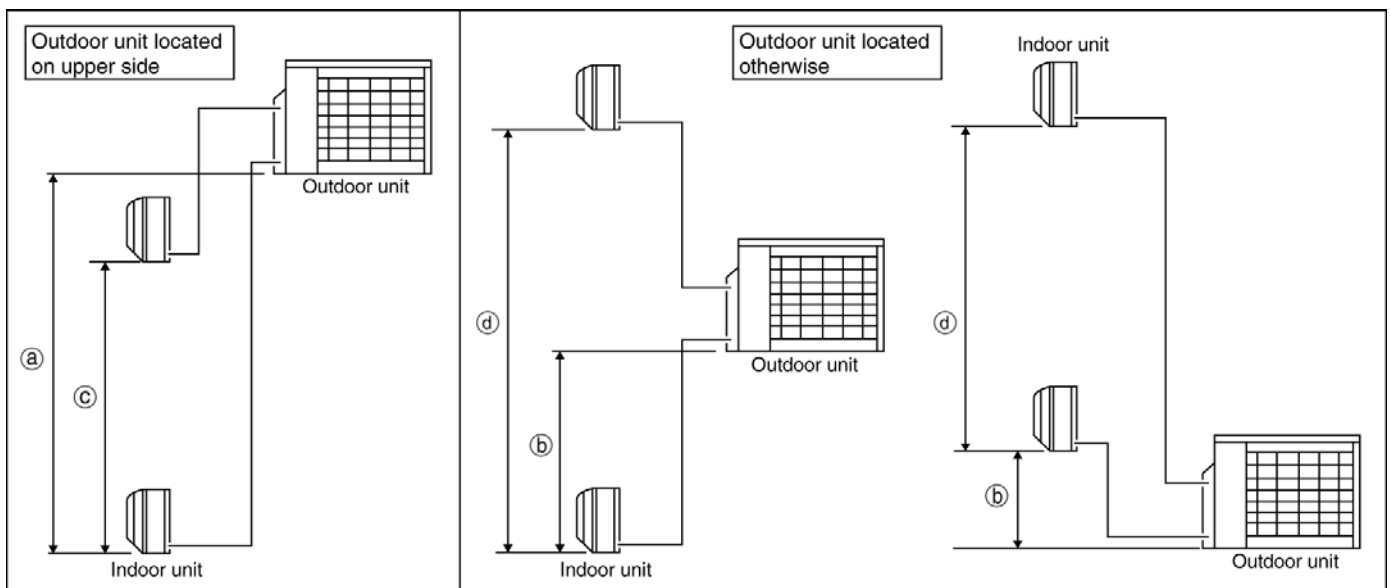
- If total piping length of all indoor units exceeds the minimum length listed above, additionally charge with 0.2 oz of refrigerant (R410A) for each additional feet of piping.

10.1.2 Outdoor Unit Installation Diagram



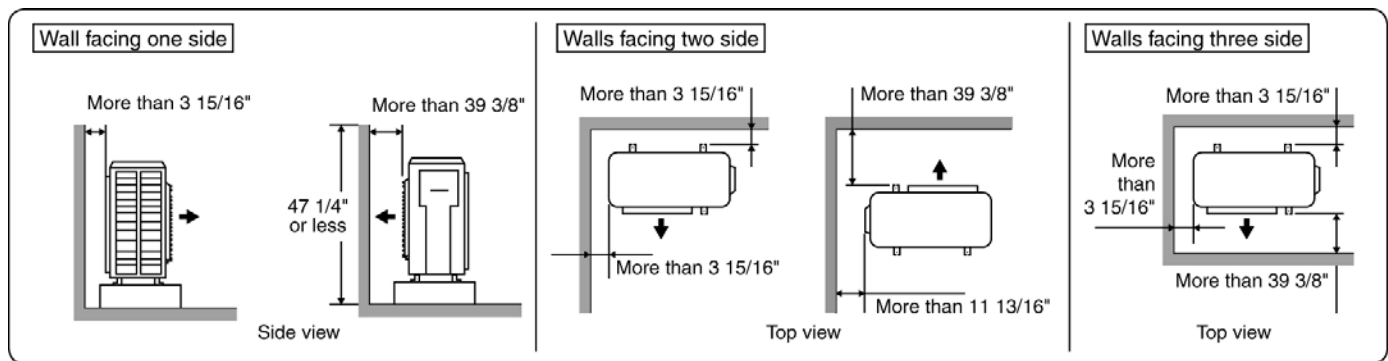
- This illustration is for explanation purposes only.
- * Note:
Respective indoor unit installation procedure shall refer to instruction manual provided in the indoor unit packaging.

Allowable piping length			
Outdoor Unit			CU-2S18***
Allowable piping length of each indoor unit (min. ~ max.)			9.8 ft ~ 82.0 ft
Allowable total piping length of all indoor unit			164.0 ft or less
Height difference between indoor and outdoor unit	Outdoor unit located on upper side	(a)	49.2 ft or less
	Outdoor unit located otherwise	(b)	24.6 ft or less
Height difference between indoor unit	Outdoor unit located on upper side	(c)	24.6 ft or less
	Outdoor unit located otherwise	(d)	49.2 ft or less



Outdoor Unit Installation Guidelines

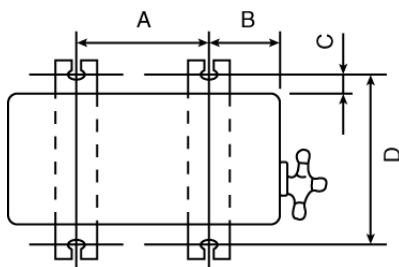
- Where a wall or other obstacle is in the path of outdoor unit's intake or exhaust airflow, follow the installation guidelines below.
- For any of the below installation patterns, the wall height on the exhaust side should be 47 1/4" or less.



Unit : inch

10.2 INSTALL THE OUTDOOR UNIT

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
 - Fix the unit on concrete or rigid frame firmly and horizontally with bolt nut ($\phi 13/32$ ").
 - When installing on a roof, please consider strong winds and earthquakes.
Please fasten the installation stand firmly with bolt or nails.



Model	A	B	C	D
CU-2S18***	24-1/8"	5-5/32"	5/8"	14-3/16"

10.3 CONNECT THE PIPING

- Remove the control board cover (resin) from the outdoor unit by loosening three screws.

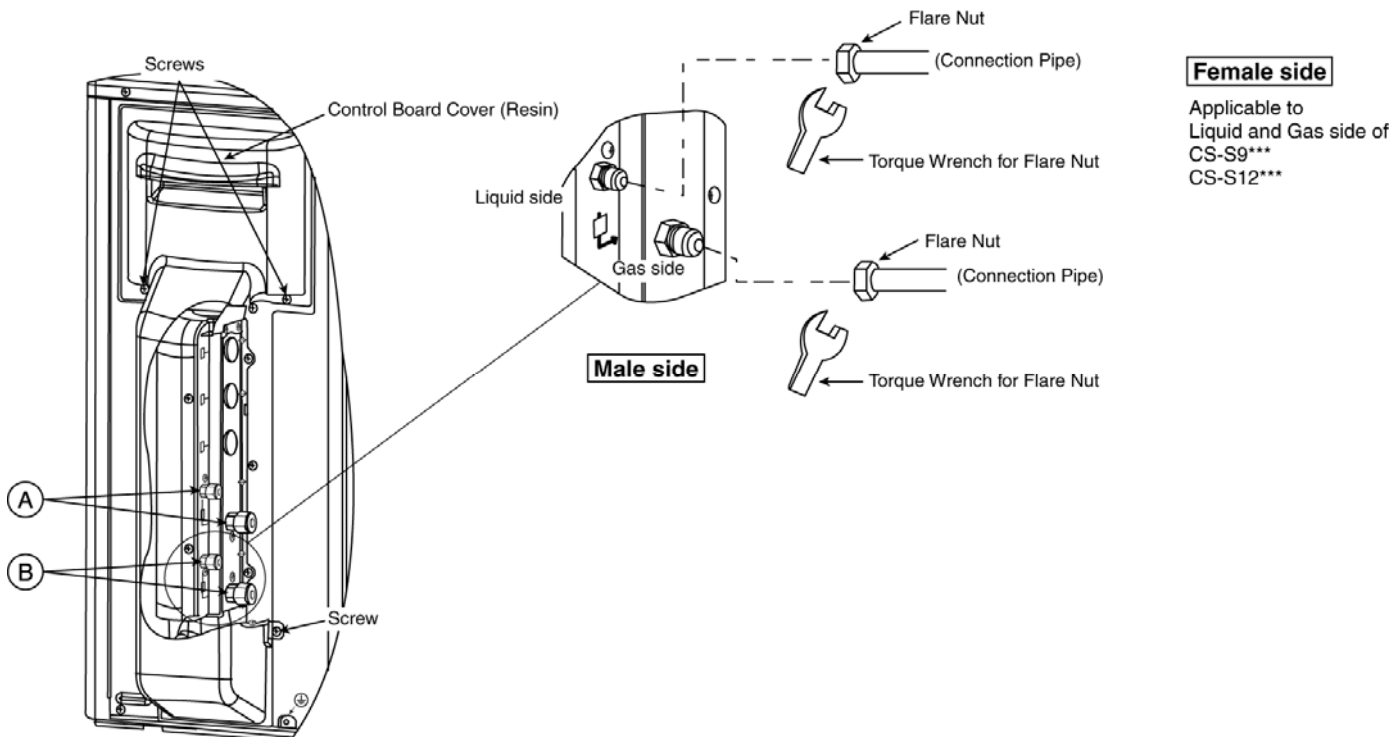
10.3.1 Connecting the Piping to Outdoor Unit

Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (locate at valve) onto the copper pipe.

Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

Do not overtighten, over tightening may cause gas leakage.

Piping size	Torque
1/4" (0.02 ft)	[18 N•m (13.3 lbf. ft)]
3/8" (0.03 ft)	[42 N•m (31.0 lbf. ft)]
1/2" (0.04 ft)	[55 N•m (40.6 lbf. ft)]
5/8" (0.05 ft)	[65 N•m (47.9 lbf. ft)]
3/4" (0.06 ft)	[100 N•m (73.8 lbf. ft)]



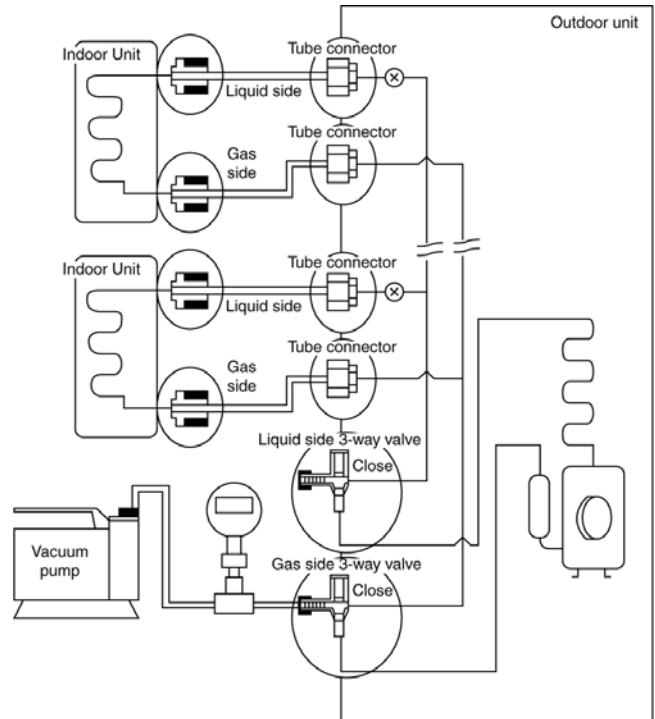
10.3.2 Gas Leak Checking

Pressure test to system to 400 PSIG with dry nitrogen, in stages. Thoroughly leak check the system. If the pressure holds, release the nitrogen and proceed to section 10.4.

10.4 EVACUATION OF THE EQUIPMENT

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.

1. Connect a charging hose with a push pin to the Low side of a charging set and the service port of the gas side 3-way valve.
 2. Connect the micron gauge between vacuum pump and service port of outdoor units.
 3. Turn on the power switch of the vacuum pump and make sure that connect digital micron gauge and to pull down to a value of 500 microns.
 4. To make sure micron gauge a value 500 microns and close the low side valve of the charging set and turn off the vacuum pump.
 5. Disconnect the vacuum pump house from the service port of the 3-way valve.
 6. Tighten the service port caps of gas side 3-way valve at a torque of 13.3 lbf.ft with a torque wrench.
 7. Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "Open" using a hexagonal wrench (5/32").
 8. Mount valve caps onto the 2-way valve and 3-way valve.
- Be sure to check for gas leakage.

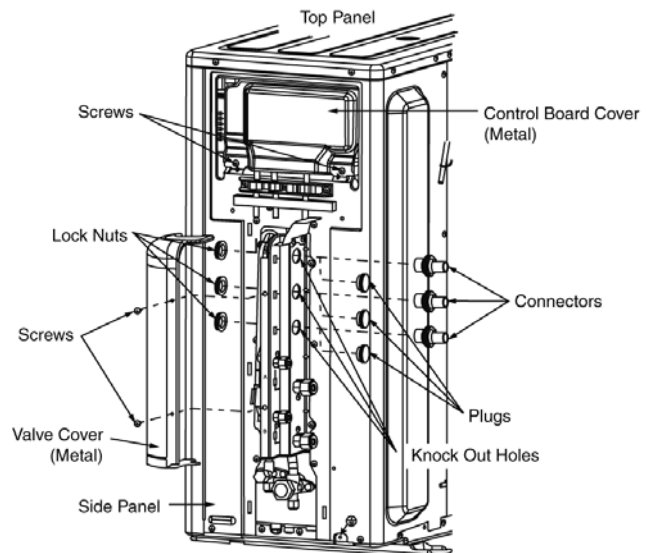


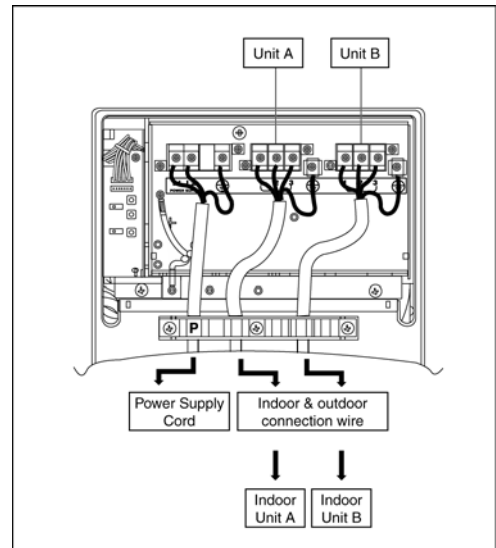
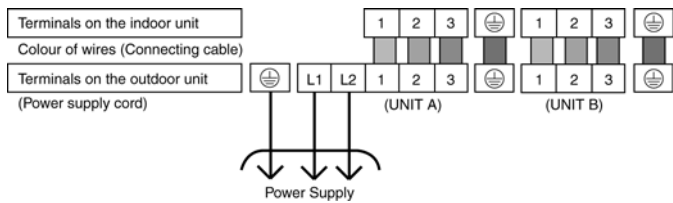
CAUTION

- If micron gauge value does not descend 500 microns, take the following measures:
 - If the leak stops when the piping connections are tightened further, continue working from step ③.
 - If the leak does not stop when the connections are retightened, repair location of leak.
 - Do not release refrigerant during piping work for installation and reinstallation.
 - Take care when handling the liquid refrigerant, it may cause frostbite.

10.5 CONNECT THE CABLE TO THE OUTDOOR UNIT

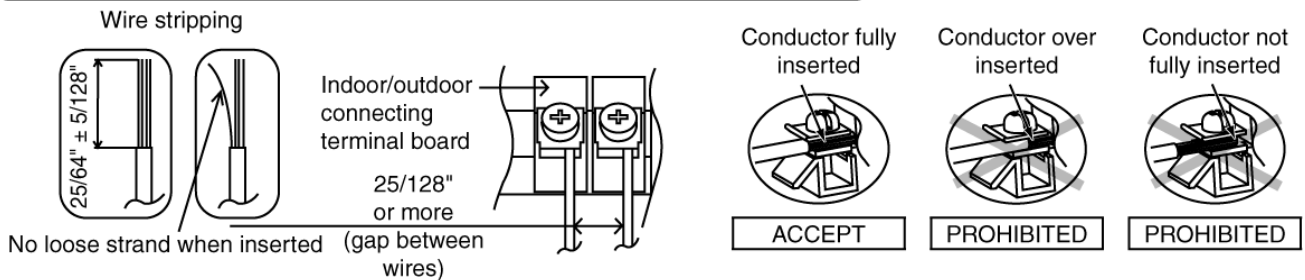
1. Remove Control Board Cover (Metal) by loosening 2 screws.
2. Remove Valve Cover (Metal) by loosening 2 screws.
3. Remove Plugs.
4. Fix the conduit connectors to the knock out holes with lock-nuts, then secure them.
5. Connecting wire between indoor unit and outdoor unit should be UL listed or CSA approved 4 conductor wires minimum AWG16 in accordance with local electric codes.
6. Wire Connection to the power supply (208/230V 60Hz) through circuit breaker.
 - Connect the UL listed or CSA approved wires minimum AWG12 to the terminal board, and connect to other end of the wires to circuit breaker.
7. Connect the power supply cord and connecting wires between indoor unit and outdoor unit according to the diagram as shown.





8. For wire stripping and connection requirement, refer to the diagram below.
9. Secure the power supply cord and connecting cables onto the control board with the holder.
10. Attach the control board cover (metal and resin) and valve cover back to the original position with screw.

WIRE STRIPPING AND CONNECTING REQUIREMENT



10.6 HEAT INSULATION

CAUTION

Use a material with good heat-resistant properties as the heat insulation for the pipes. Be sure to insulate both the gas-side and liquid-side pipes. If the pipes are not adequately insulated, condensation or water leakages may occur.

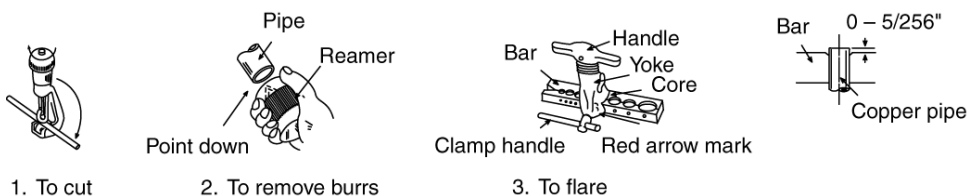
Liquid-side pipes

Material shall withstand 248°F or higher

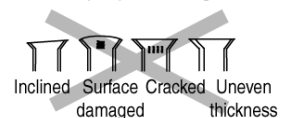
Gas-side pipes

Cutting and Flaring the Piping

- 1 Please cut using pipe cutter and then remove the burrs.
- 2 Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
- 3 Please make flare after inserting the flare nut onto the copper pipes.



Improper flaring



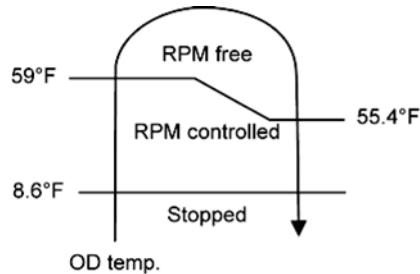
When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

11. Operation Control

11.1 Cooling Operation

11.1.1 Outdoor fan control

- When cooling operation is enabled, based on outdoor ambient temperature, fan motor control will be adjusted according to figure below:



11.1.2 Powerful Operation 1

- During cooling operation, this control is to concentrate outdoor unit capability to the powerful operation enabled indoor unit by temporary stop the capability supply to low load demand indoor units.
- Operation start condition:
 - Powerful operation ON for targeted indoor unit.
- Operation content:
 - If other indoor units (where Powerful operation are OFF) achieve setting temperature continuously for 1 minutes after received powerful command from indoor unit, then capability supply to other indoor units are stopped for minimum 3 minutes. Capability supply stop period follows powerful operation period.
- Operation stops when comply either one of the following conditions:
 - When other indoor units (where Powerful operation are OFF) is lower than setting temperature.
 - When the powerful operation is OFF for all indoor units.
 - When Quiet operation received from 1 indoor unit.
 - When protection control starts.

11.1.3 Powerful Operation 2

- During cooling operation, this control is to provide fast cooling operation compare to normal operation.
- Operation start if all condition below are complied:
 - Powerful operation ON for indoor unit.
- Operation content:
 - Outdoor fan speed will adjust automatically.
 - Compressor frequency will adjust automatically.
- Operation stop when comply either one of the follow conditions:
 - When the powerful operation is OFF for all indoor units.

12. Protection Control

12.1 Freeze Prevention control (Cool)

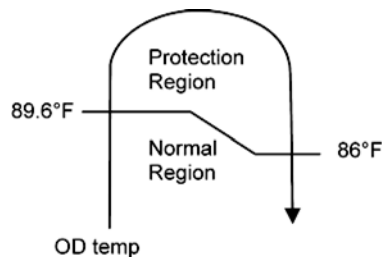
- When received freeze prevention signal from indoor unit, the compressor frequency changes according to indoor heat exchanger temperature.
- When indoor unit request capability OFF due to freeze condition , immediately the capability supply to targeted indoor unit stops.

12.2 Dew Prevention control (Cool)

- When received dew prevention signal from indoor unit, the compressor frequency changes according to indoor intake temperature and indoor heat exchanger temperature.

12.3 Electronic Parts Temperature Rise Protection 1 (Cool)

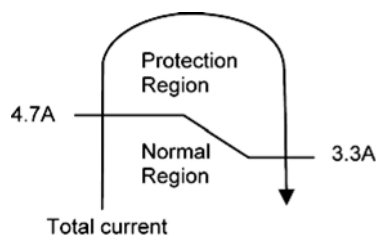
- This control prevents electronic parts temperature rise during cooling overload condition.
- Start conditions:
 - Outdoor ambient temperature is at protection region as shown in figure below:



- Outdoor unit total current is above 5.5A
- Control content
 - Outdoor fan speed is adjusted accordingly.
- Control stop condition
 - When outdoor ambient temperature is back to normal region.
- During this control, outdoor fan speed does not reduce for Quiet operation.

12.4 Electronic Parts Temperature Rise Protection 2 (Cool)

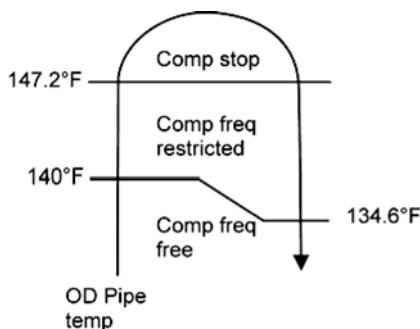
- This control prevents electronic parts temperature rise during cooling/dry operation.
- Start conditions:
 - Total current is at protection region as shown in figure below:



- Control content
 - Outdoor fan speed is adjusted accordingly.
- Control stop condition
 - When total current is back to normal region.
- During this control, outdoor fan speed does not reduce for Quiet operation.

12.5 Cooling overload control (Cool)

- This control detect outdoor pipe temperature and perform the compressor frequency restriction during cooling operation.



12.6 Time Delay Safety Control (Restart Control)

- The compressor will not restart within three minutes after compressor is stopped.
- This control is not applicable if the power supply reset.

12.7 30 seconds Force Operation

- Once the compressor starts operation, it will not stop its operation for 30 seconds in order to cycle back compressor oil.
- However, it can be stopped using remote control or Auto OFF/ON button at indoor unit.

12.8 Total Current Control

- By referring to table below, during normal (default) operation, the running current refer to Hi values and during Power Save Mode, the running current refer to Lo values.
- When the outdoor unit total running current (AC) exceeds X value, compressor frequency will decrease.
- If the running current does not exceed X value for 5 seconds, compressor frequency will increase.
- However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for 3 minutes.

Operation Mode		CU-2S18NBU-1	
		X (A)	Y (A)
Cooling/Soft Dry (A)	Hi	14.0	17.5
	Lo	7.8	17.5
Cooling/Soft Dry (B)	Hi	14.0	17.5
	Lo	7.8	17.5

12.9 IPM (power transistor) Protection Control

- Overheating Prevention Control
 - If IPM temperature rises to 176°F, outdoor fan speed will be increased.
 - When the IPM temperature rises to 203°F, compressor operation will stop immediately.
 - Compressor operation restarts when temperature decreases to 194°F.
 - If IPM temperature detected less than -22°F, IPM is judged as open circuit ("F96" is indicated).
- DC Peak Current Control
 - When IPM DC current exceeds set value of 30.0 ± 3.0 A, the compressor will stop.
 - If the DC peak current detected within 30 seconds after operation starts, compressor will restart after 1 minute.
 - If the DC peak current detected 30 seconds or more after operation starts, compressor will restart after 2 minute.
 - Within 30 seconds after compressor restarts, if the DC peak current is exceeded set value continuously for 7 times, all indoor and outdoor relays will be cut off ("F99" is indicated).
- Error reset can be done by power supply reset.

12.10 Compressor Protection Control (Gas leak detection control 1)

- Control start conditions
 - For 5 minutes, the compressor continuously operates and total current is low.
 - During Cooling or Soft Dry operation:
Indoor intake temperature — indoor piping temperature is below 39.2°F.
- Control content
 - Compressor stops (and restart after 3 minutes)
 - If the conditions above happen 4 times within 60 minutes, the unit will stop operation ("F91" is indicated).

12.11 Compressor Protection Control (Gas leak detection control 2)

- This control detect gas leakage condition to prevent compressor damage.
- Control start condition
 - All connected indoor units capability supply ON.
 - Compressor ON with maximum frequency.
 - Compressor discharge temperature high.
- Control content
 - Compressor OFF during this control ("F91" is memorized in EEPROM)
 - If the above conditions happen 2 times within 60 minutes, indoor units' Timer LED will blinks ("F91" is indicated at all indoor units)

12.12 Valve close detection control

- This control detects 3-way valve close condition to prevent damage to refrigerant cycle.
- Start conditions:
 - For all connected indoor units, if Indoor intake temperature — indoor piping temperature are between 28.4°F and 35.6°F continuously for 5 minutes after compressor ON at first cooling operation.
 - The first cooling operation is defined as cooling operation is ON for less than 8 minutes after new installation or after pump down.
- Control content
 - During this control, compressor stop, indoor units' Timer LED will blink. ("F91" is indicated at indoor units)
- Error reset can be done by power supply reset or reset by using remote control.

12.13 Compressor discharge high pressure protection control

- This control protect by using high pressure switch during operation.
- Start conditions
 - High pressure switch is activated (from normally close to open) when outdoor operation mode is cooling during compressor running.
- Control 1 content
 - Compressor stop when high pressure switch is opened and restart after high pressure switch closed. If this condition happen 4 times within 30 minutes, "F94" is indicated.
 - After 30 minutes, counter is reset if this condition does not happen for 4 times.
- Control 1 stop conditions
 - Power supply reset
 - Reset by using remote control

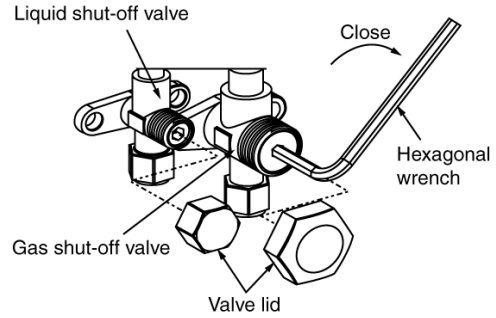
13. Servicing Mode

13.1 Pump Down Operation

- Operate the pump down according to the following procedures.
 - Confirm the valve on the liquid side and gas side is open.
 - Press PUMP DOWN switch (SW1) on the display printed circuit board for more than 5 seconds. Pump down (cooling) operation is performed for 15 minutes.
 - Set the liquid side 3 way valve to close position and wait until the pressure gauge indicates 1.45 PSI.
 - Immediately set the gas side valve to close position and then press the PUMP DOWN switch (SW1) to stop the pump down operation.

Note: Pump down operation will stop automatically after 15 minutes if PUMP DOWN switch (SW1) is not pressed again.

Pump down operation cannot be restarted until 3 minutes after compressor is stopped.



LED	2	3	4	5	Message
Status	○	○	○	○	Pump down operation progress
	○	○	○		3 minutes before operation end
	○	○			2 minutes before operation end
	○				1 minute before operation end
					Pump down operation end

○ : Flashing

13.2 Test Operation

- Test operation can be carried out using OPERATION TEST switch (SW2) on the display printed circuit board inside the outdoor unit. For cooling test, press the TEST OPERATION switch (SW2) for more than 5 seconds. LED 1 and LED 2 will illuminate when shift into cooling test operation.

13.3 Wiring Error Check

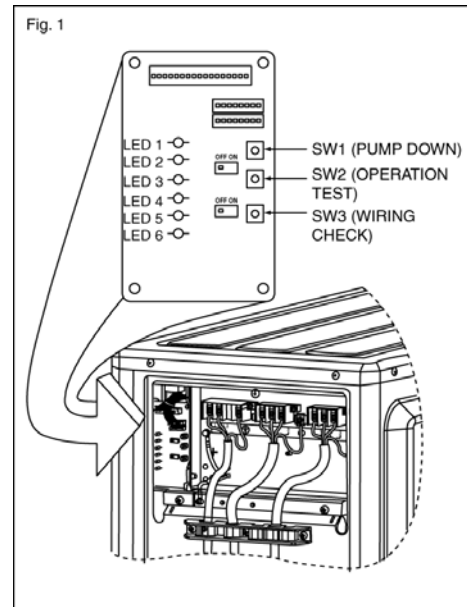
This product capable to correcting the wiring errors automatically by following procedures.

- Confirm the valve on the liquid side and gas side is open.
- Press WIRING CHECK switch (SW3) on the display printed circuit board for more than 10 seconds to start wiring check operation.
- Wiring check process will complete in approximately 10 minutes. However, wiring check operation will not start within 3 minutes after compressor is stopped. When outdoor air temperature is less than 41°F or unit has abnormality, wiring check will not start. (See NOTE 2).

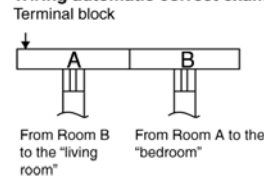
The LED 2 to 6 in display printed circuit board inside the outdoor unit indicate whether correction is possible or not and the status of the correction, as shown in the table below.

LED	2	3	4	5	6	Message
ROOM	A	B	-	-	-	
Status	All flashing					Automatic correction impossible
	LED 2, 4, 6 and LED 3, 5 alternatively flashing					Wiring check in progress
	Flashing one after another					Automatic correction completed
	Other than above					Unit has abnormally (Note 4)

If automatic correct is impossible, check the indoor unit wiring and piping manually.



Wiring automatic correct example



Wiring error check

LED lighting sequence after a wiring correction.
Order of LED flashing: 3--> 2

NOTE
<ol style="list-style-type: none">1. For two rooms, LED 4 and 5 are not illuminated after wiring operation complete.2. If the outdoor air temperature is less than 41°F or unit has abnormality, wiring operation will not start.3. After wiring check operation is complete, LED indication will illuminated until normal operation starts.4. Follow the product diagnosis procedure. (Check the diagnostic label at the control board cover.)5. When LED 1 only illuminate, indicates that outdoor unit is operating normally.

13.4 Power Save Mode

- Power Save Mode can be enabled by pushing POWER SAVE switch (SW4) to ON before power supply ON.
- When Power Save Mode is ON, the unit can be operate at lower running current where the breaker capacity not achieve the requirement.

13.5 Mode priority function

- Mode priority function can be enabled by pushing MODE PRIORITY switch (SW5) to ON before power supply ON.
- When Mode Priority Function is ON, the mode priority is given to higher capacity indoor units.

14. Troubleshooting Guide

14.1 Self Diagnosis Function

- The display screen of wireless remote control unit and the self-diagnosis LEDs (green) on the outdoor printed circuit board in the outdoor unit can be used to identify the location of the problem.
Refer to the table below to identify and solve the cause of the problem, and then re-start the air conditioner system.
- If the problem is solved and operation returns to normal.
LED 1 illuminates and others LED are off.

Diagnosis display	Abnormality or Protection control	LED 6	LED 5	LED 4	LED 3	LED 2	LED 1	Abnormality Judgment	Protection Operation	Problem	Check location
H11	Indoor/outdoor abnormal communication						○	After operation for 1 minute	Indoor fan only operation can start by entering into force cooling operation	Indoor/outdoor communication not establish	<ul style="list-style-type: none"> Indoor/outdoor wire terminal Indoor/outdoor PCB Indoor/outdoor connection wire
H12	Indoor unit capacity unmatched					○		90s after power supply	—	Total indoor capability more than maximum limit or less than minimum limit, or number of indoor unit less than two	<ul style="list-style-type: none"> Indoor/outdoor connection wire Indoor/outdoor PCB Specification and combination table in catalogue
H15	Compressor temperature sensor abnormality					○	○	Continuous for 5s	—	Compressor temperature sensor open or short circuit	<ul style="list-style-type: none"> Compressor temperature sensor lead wire and connector
H16	Outdoor current transformer (CT) abnormality				○		○	—	—	Current transformer faulty or compressor faulty	<ul style="list-style-type: none"> Outdoor PCB faulty or compressor faulty
H27	Outdoor air temperature sensor abnormality				○	○		Continuous for 5s	—	Outdoor air temperature sensor open or short circuit	<ul style="list-style-type: none"> Outdoor air temperature sensor lead wire and connector
H28	Outdoor heat exchanger temperature sensor 1 abnormality				○	○	○	Continuous for 5s	—	Outdoor heat exchanger temperature sensor 1 open or short circuit	<ul style="list-style-type: none"> Outdoor heat exchanger temperature sensor 1 lead wire and connector
H32	Outdoor heat exchanger temperature sensor 2 abnormality			○				Continuous for 5s	—	Outdoor heat exchanger temperature sensor 2 open or short circuit	<ul style="list-style-type: none"> Outdoor heat exchanger temperature sensor 2 lead wire and connector
H33	Indoor/outdoor misconnection abnormality			○			○	—	—	Indoor and outdoor rated voltage different	<ul style="list-style-type: none"> Indoor and outdoor units check
H36	Outdoor gas pipe temperature sensor abnormality			○		○		Continuous for 5s	Heating protection operation only	Outdoor gas pipe temperature sensor open or short circuit	<ul style="list-style-type: none"> Outdoor gas pipe temperature sensor lead wire and connector
H37	Outdoor liquid pipe temperature sensor abnormality			○		○	○	Continuous for 5s	Cooling protection operation only	Outdoor liquid pipe temperature sensor open or short circuit	<ul style="list-style-type: none"> Outdoor liquid pipe temperature sensor lead wire and connector
H64	Outdoor high pressure sensor abnormality			○	○			Continuous for 1 minutes	—	High pressure sensor open circuit during compressor stop	<ul style="list-style-type: none"> High pressure sensor Lead wire and connector
H97	Outdoor fan motor mechanism lock			○	○		○	2 times happen within 30 minutes	—	Outdoor fan motor lock or feedback abnormal	<ul style="list-style-type: none"> Outdoor fan motor lead wire and connector Fan motor lock or block

Diagnosis display	Abnormality or Protection control	LED 6	LED 5	LED 4	LED 3	LED 2	LED 1	Abnormality Judgment	Protection Operation	Problem	Check location
H98	Indoor high pressure protection			○	○	○		—	—	Indoor high pressure protection (Heating)	<ul style="list-style-type: none"> • Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
H99	Indoor operating unit freeze protection			○	○	○		—	—	Indoor freeze protection (Cooling)	<ul style="list-style-type: none"> • Check indoor heat exchanger • Air filter dirty • Air circulation short circuit
F11	4-way valve switching abnormality			○	○	○	○	4 times happen within 30 minutes	—	4-way valve Switching abnormal	<ul style="list-style-type: none"> • 4-way valve • Lead wire and connector
F17	Indoor standby units freezing abnormality		○					3 times happen within 40 minutes	—	Wrong wiring and connecting pipe, expansion valve leakage, indoor heat exchanger sensor open circuit	<ul style="list-style-type: none"> • Check indoor/outdoor connection wire and pipe • Indoor heat exchanger sensor lead wire and connector • Expansion valve lead wire and connector
F90	Power factor correction (PFC) circuit protection		○				○	4 times happen within 10 minutes	—	Power factor correction circuit abnormal	<ul style="list-style-type: none"> • Outdoor PCB faulty
F91	Refrigeration cycle abnormality		○			○		2 times happen within 20 minutes	—	Refrigeration cycle abnormal	<ul style="list-style-type: none"> • Insufficient refrigerant or valve close
F93	Compressor abnormal revolution		○			○	○	4 times happen within 20 minutes	—	Compressor abnormal revolution	<ul style="list-style-type: none"> • Power transistor module faulty or compressor lock
F94	Compressor discharge pressure overshoot protection		○		○			4 times happen within 30 minutes	—	Compressor discharge pressure overshoot	<ul style="list-style-type: none"> • Check refrigeration system
F95	Outdoor cooling high pressure protection		○		○		○	4 times happen within 20 minutes	—	Cooling high pressure protection	<ul style="list-style-type: none"> • Check refrigeration system • Outdoor air circuit
F96	Power transistor module overheating protection		○		○	○		4 times happen within 30 minutes	—	Power transistor module overheat	<ul style="list-style-type: none"> • PCB faulty • Outdoor air circuit (fan motor)
F97	Compressor overheating protection		○		○	○	○	3 times happen within 30 minutes	—	Compressor overheat	<ul style="list-style-type: none"> • Insufficient refrigerant
F98	Total running current protection		○	○				3 times happen within 20 minutes	—	Total current protection	<ul style="list-style-type: none"> • Check refrigeration system • Power source or compressor lock
F99	Outdoor direct current (DC) peak detection		○	○			○	Continuous happen for 7 times	—	Power transistor module current protection	<ul style="list-style-type: none"> • Power transistor module faulty or compressor lock

LED 1 illuminate is indicated that outdoor unit is operating normally. If the LED 1 is switched off or flashing, check the power supply and self-diagnosis indication.

●	-----	Illuminate
○	-----	Flashing
Blank	-----	OFF

15. Disassembly and Assembly Instructions



WARNING

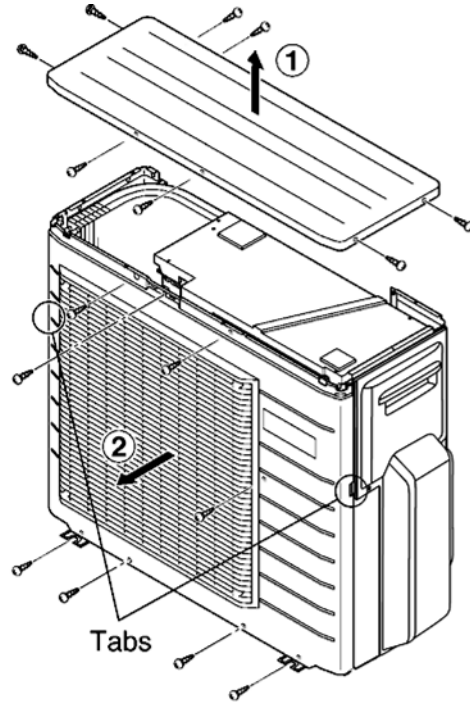
High Voltages are generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

15.1 Outdoor Unit Removal Procedure

 **Caution!** When handling electronic controller, be careful of electrostatic discharge.

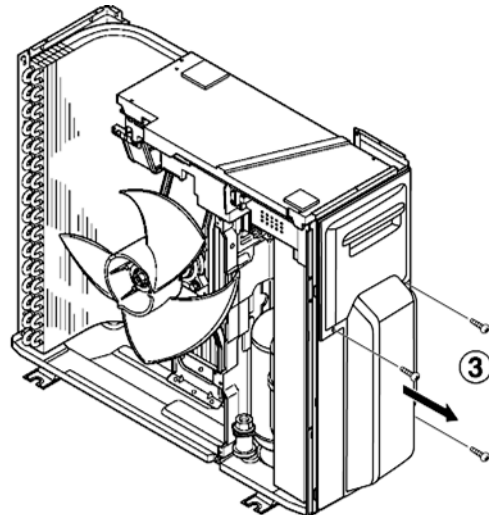
15.1.1 Removing the Cabinet Top Plate and Cabinet Front Plate

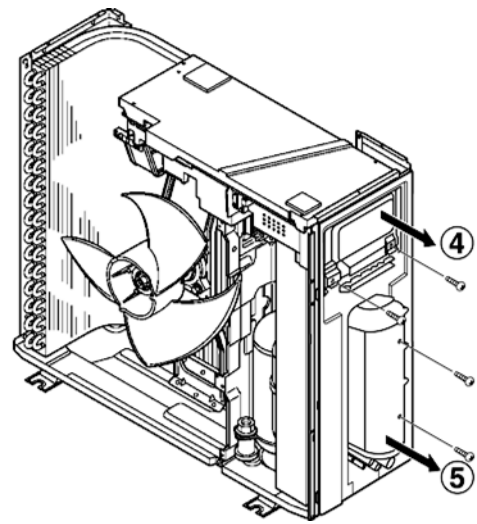
1. Remove the cabinet top plate (remove the 8 screws).
2. Remove the 8 screws (1 on the center, 3 at the top and 4 at the bottom) securing the cabinet front plate, release the 2 hooks (1 each at the left and right), and pull the cabinet front plate toward front side.



15.1.2 Remove the Control Board Cover and Particular Plates

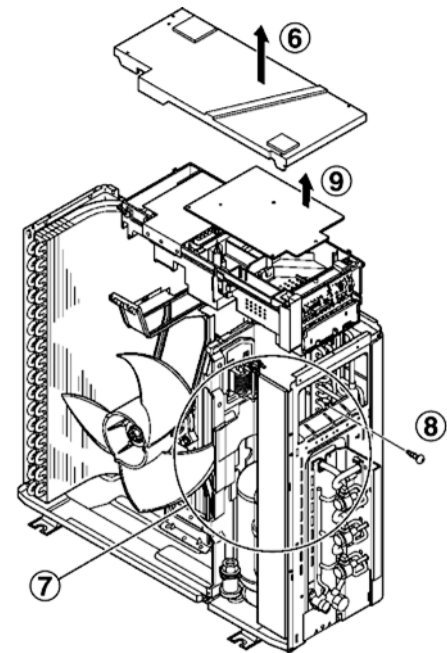
3. Remove the control board cover (remove 3 screw).
4. Remove the particular plate (remove 2 screw).
5. Remove the particular plate (remove 2 screw).





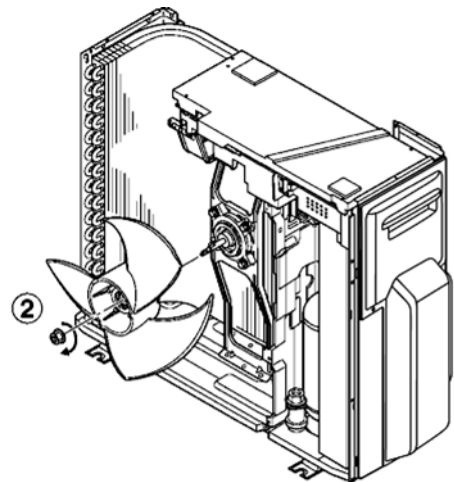
15.1.3 Removing the Control P.C. Board

6. Remove the drip proof cover.
7. Disconnect the connectors (lead wires of the compressor, sensor, and others).
8. Remove the screw at the right side of the control box, and pull out the entire control box.
9. Release the control P.C. Board tab to remove the control P.C. Board.

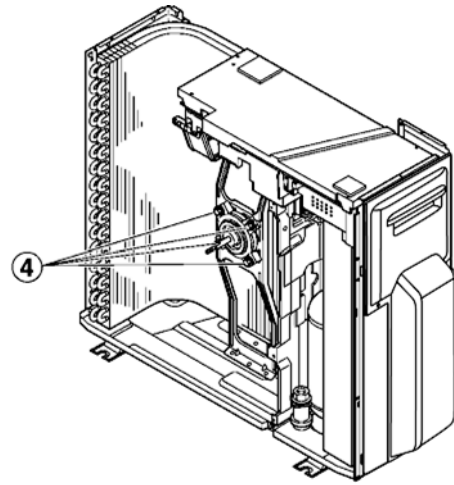


15.1.4 Removing the Propeller Fan and Fan Motor

1. Follow the steps in 15.1.1 for removing the cabinet top plate and cabinet front plate.
2. Remove the propeller fan by removing the nut turning clockwise at its center.



3. Disconnect the fan motor connector from the control P.C. Board.
4. Loosen the 4 fan motor mounting screws then remove the fan motor.

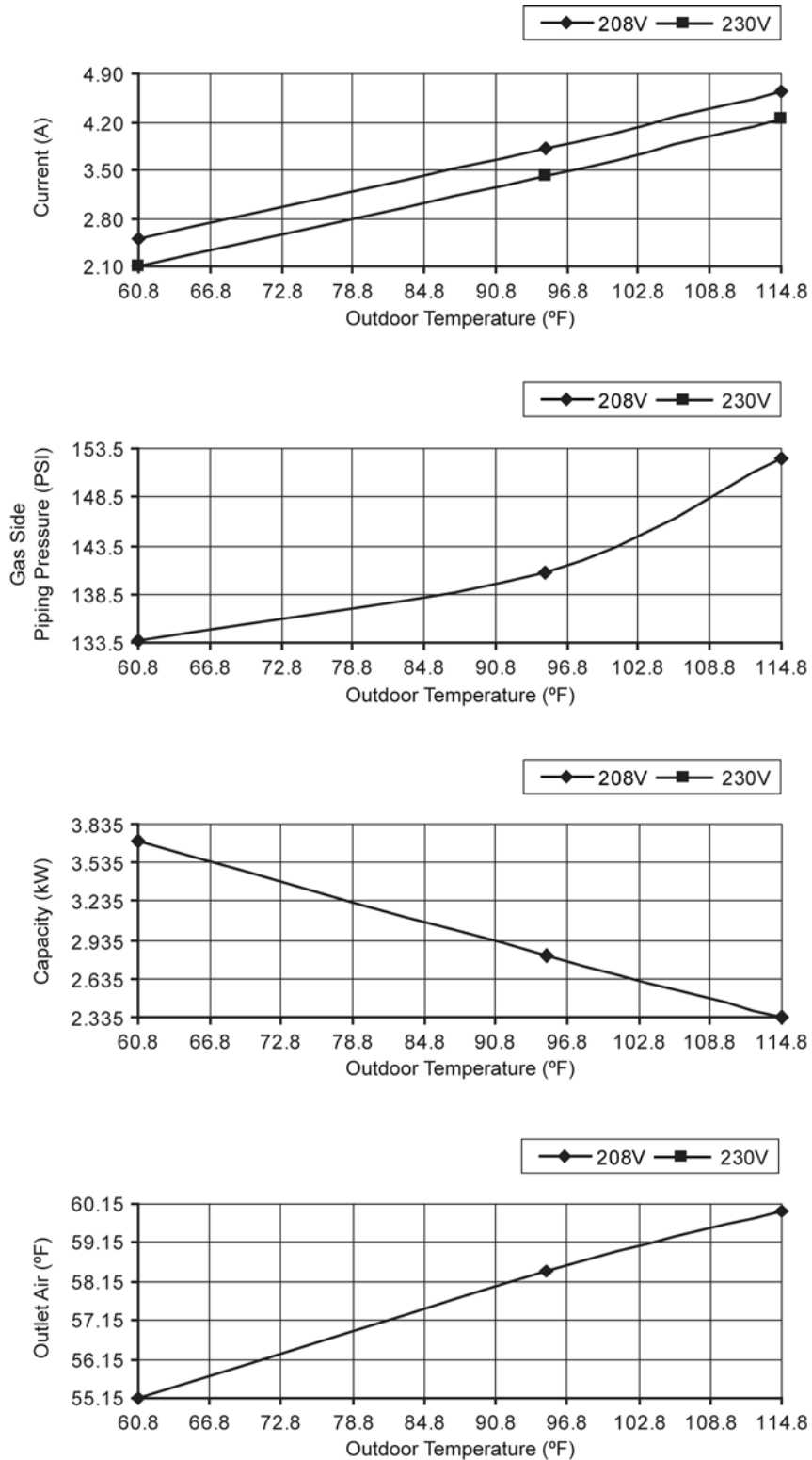


16. Technical Data

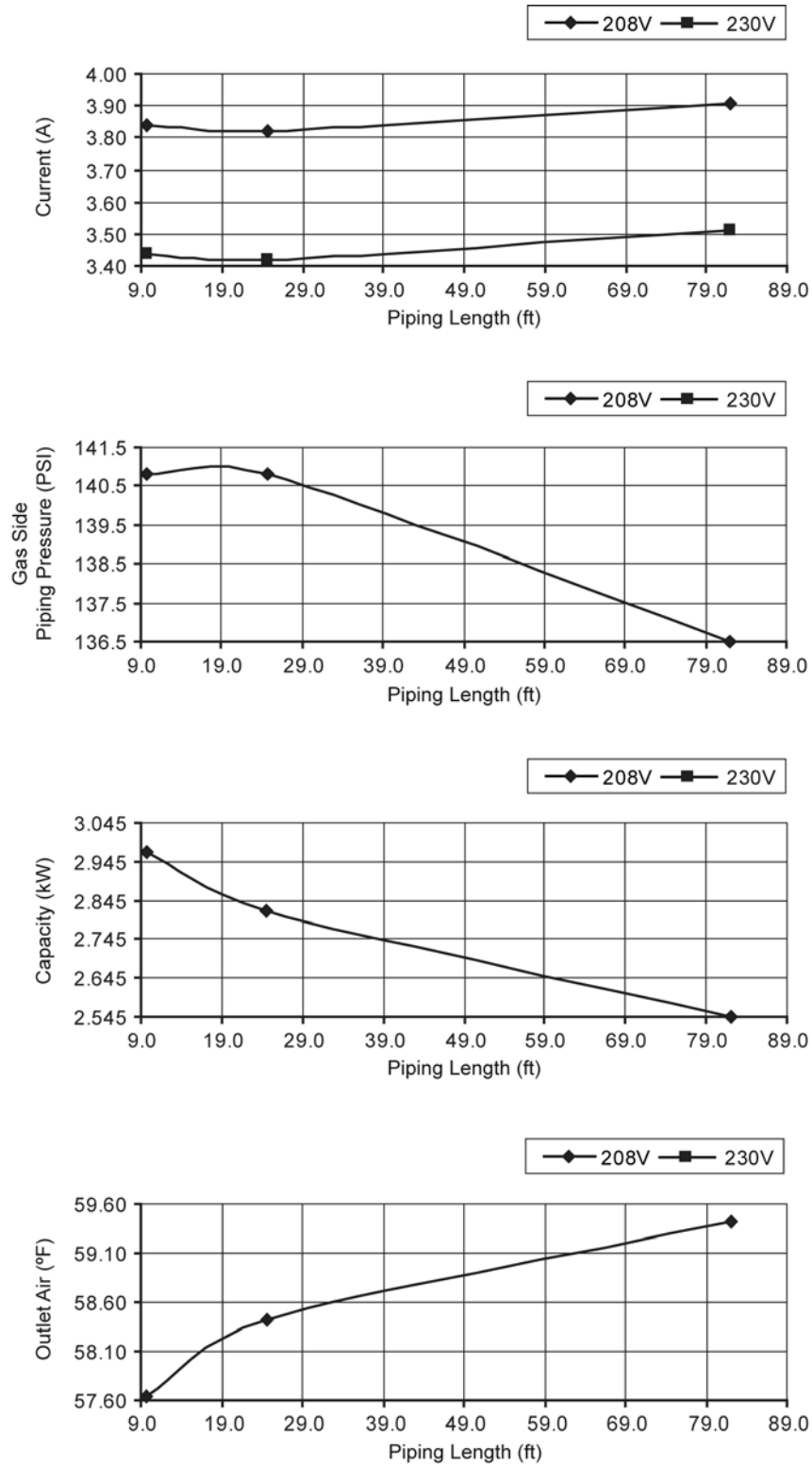
16.1 Operation Characteristics

16.1.1 CS-S9NKUW-1 CU-2S18NBU-1

- Cooling Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Piping length: 24.6ft
 - Compressor Freq: Fc

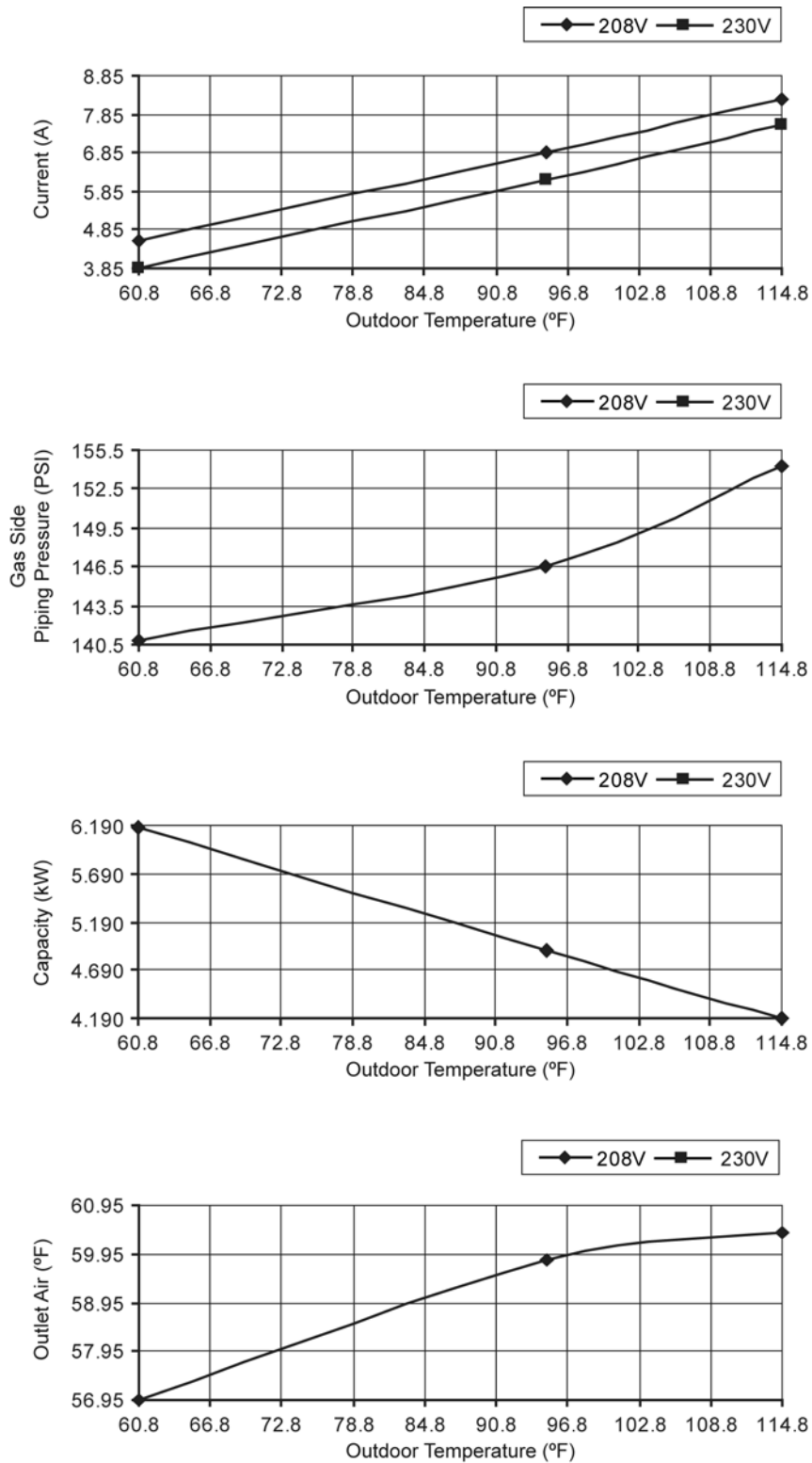


- Piping Length Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Outdoor temperature: 95°F (DBT)
 - Compressor Freq: Fc

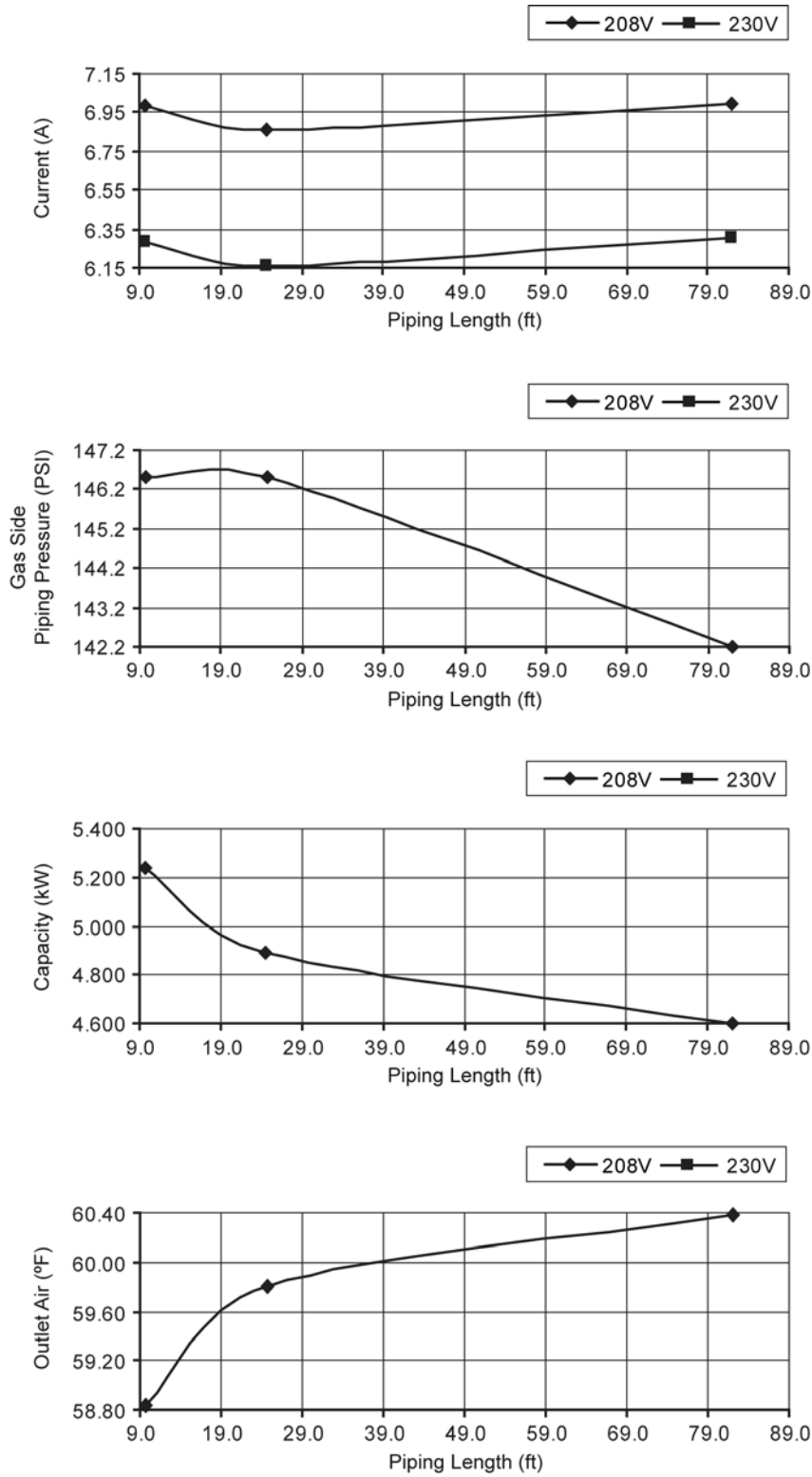


16.1.2 CS-S9NKUW-1x2 CU-2S18NBU-1

- Cooling Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Piping length: 24.6ft
 - Compressor Freq: Fc

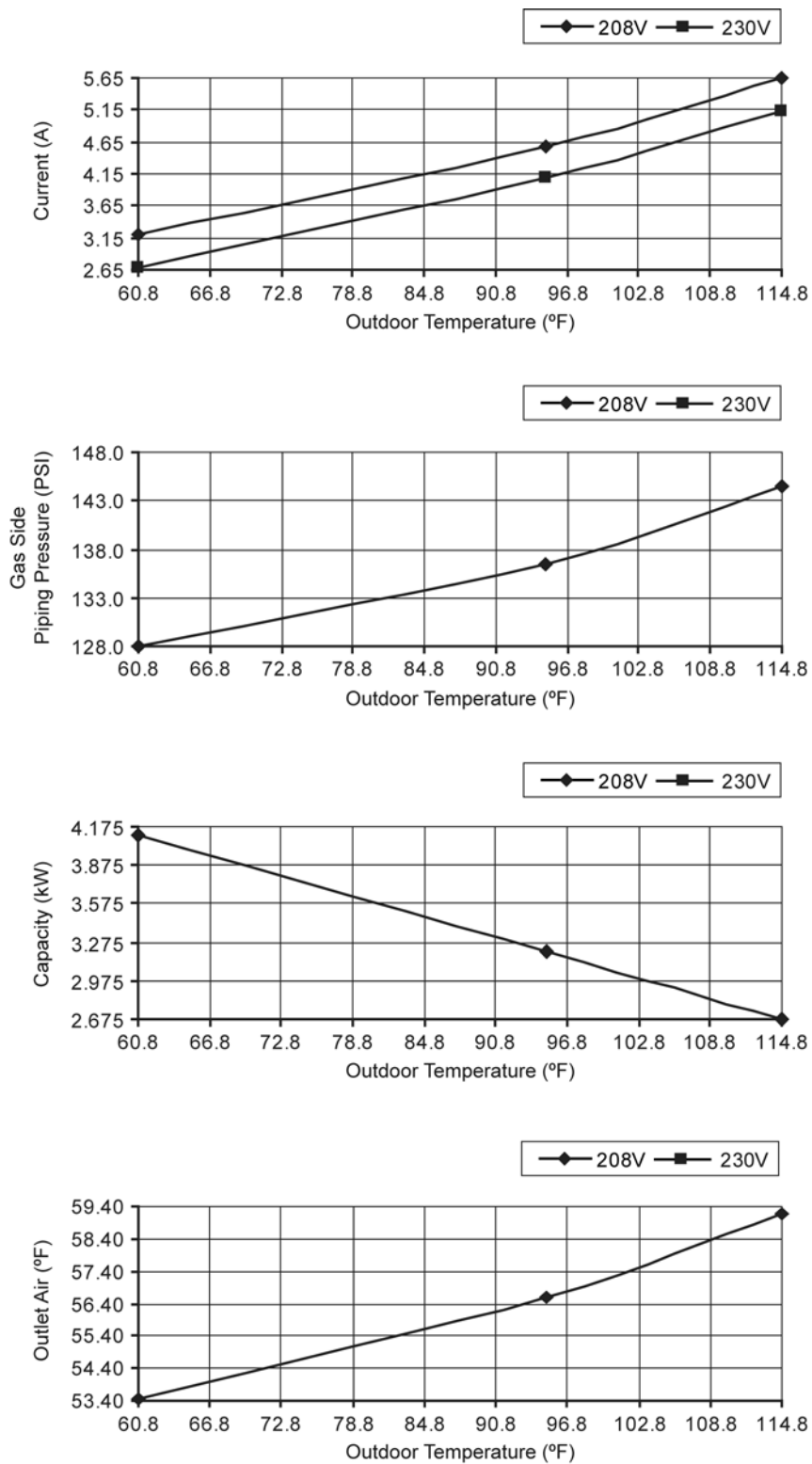


- Piping Length Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Outdoor temperature: 95°F (DBT)
 - Compressor Freq: Fc

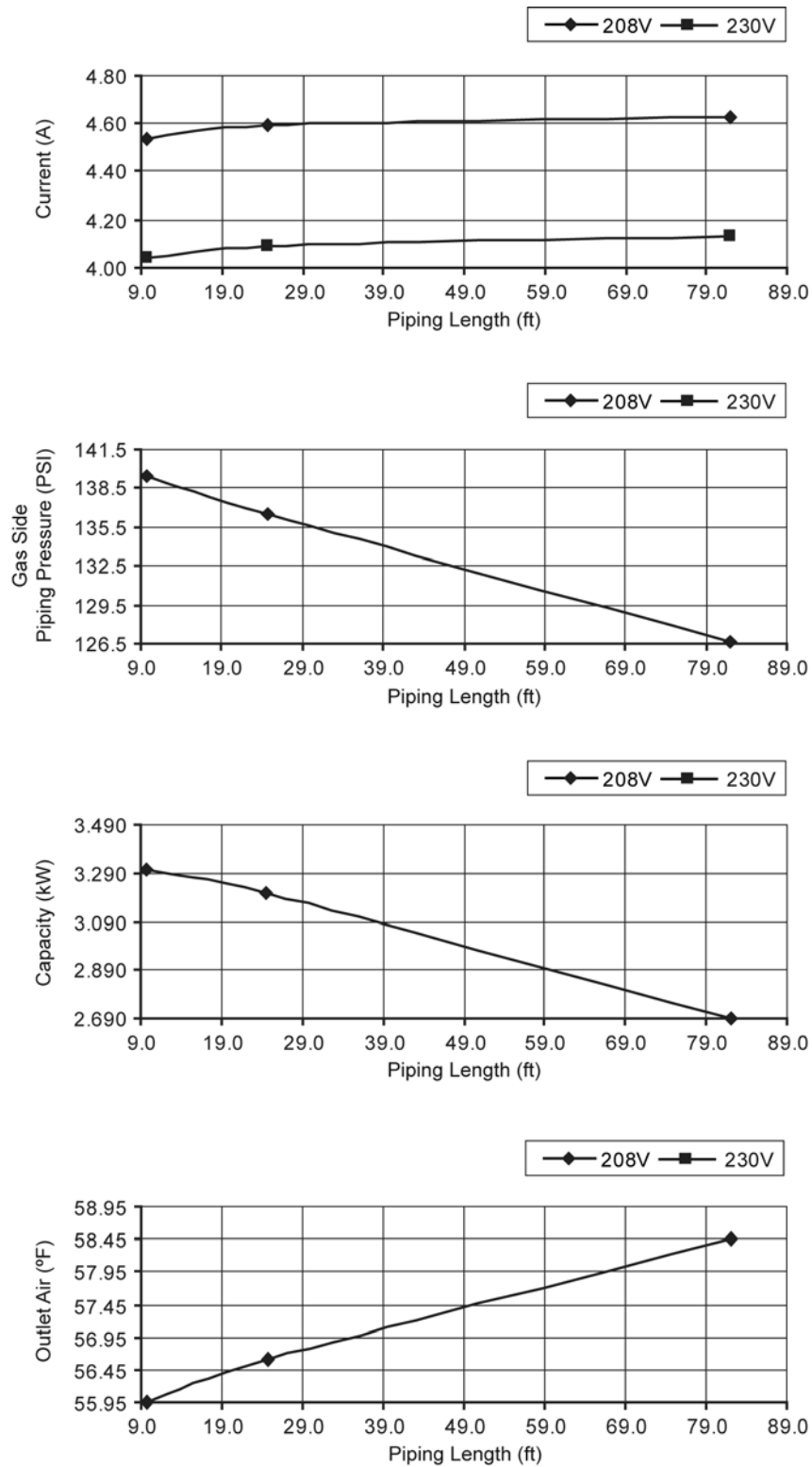


16.1.3 CS-S12NKUW-1 CU-2S18NBU-1

- Cooling Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Piping length: 24.6ft
 - Compressor Freq: Fc

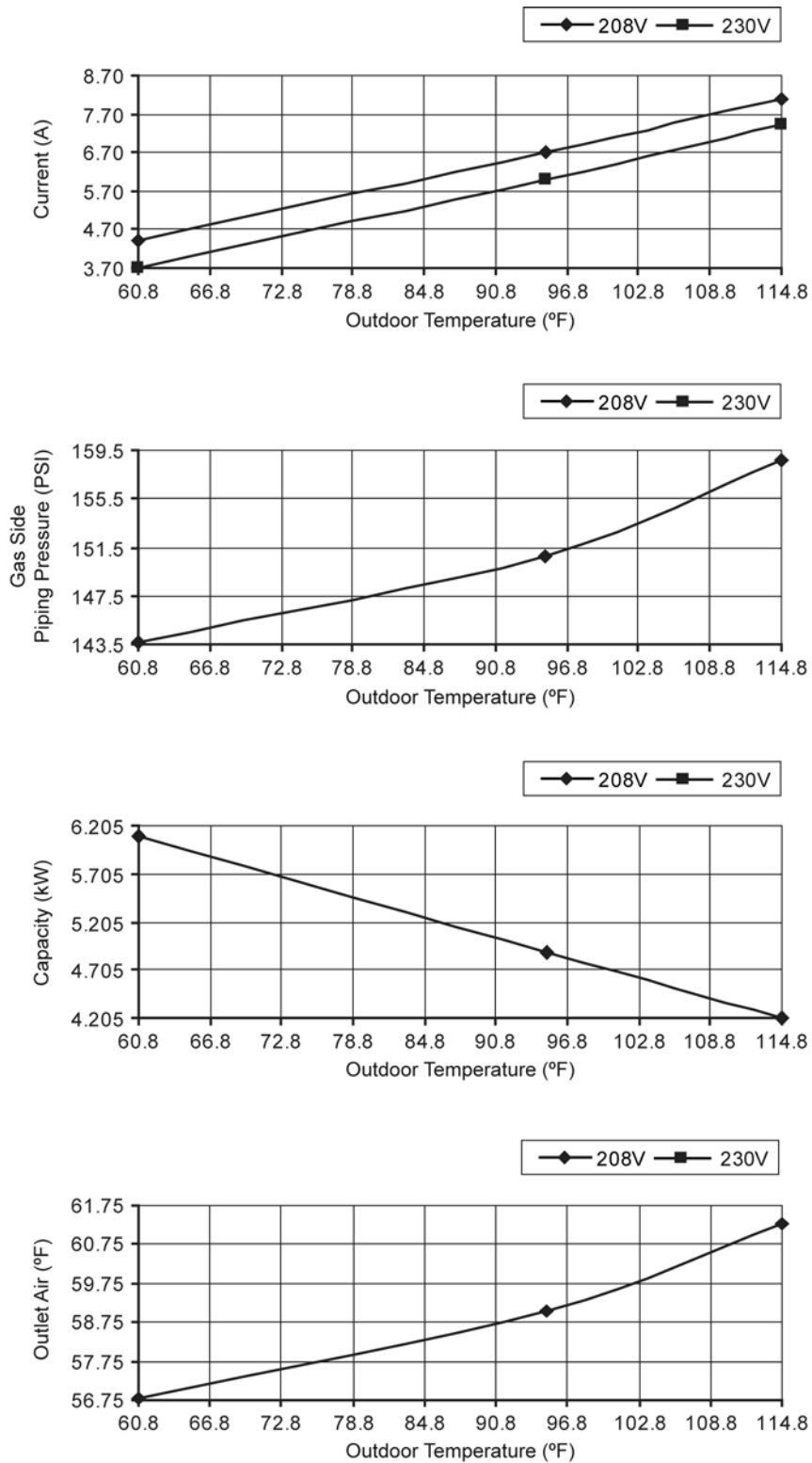


- Piping Length Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Outdoor temperature: 95°F (DBT)
 - Compressor Freq: Fc

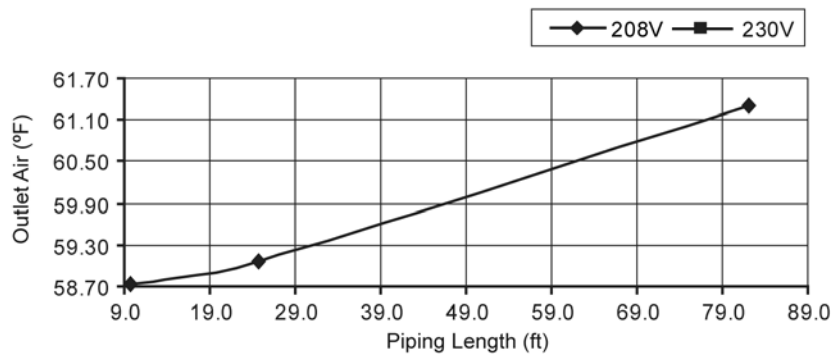
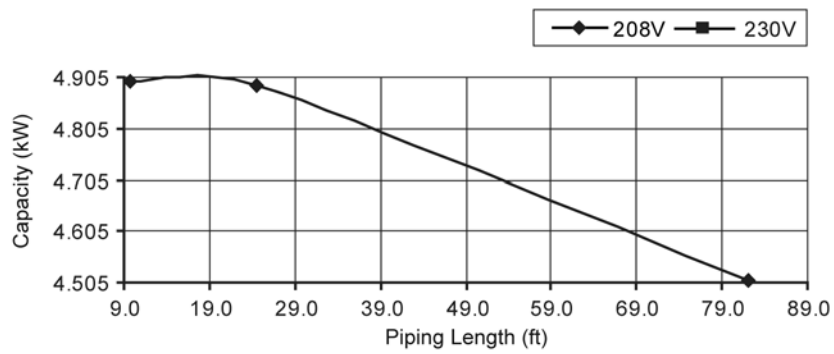
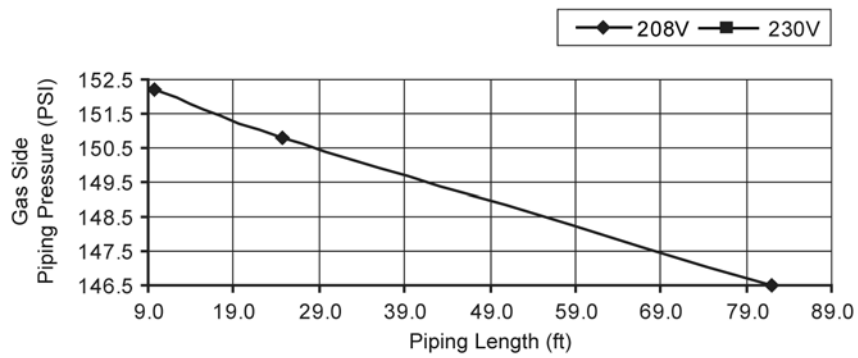
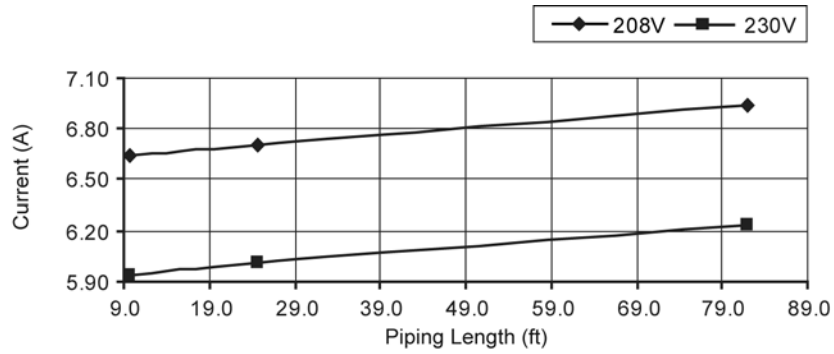


16.1.4 CS-S12NKUW-1x2 CU-2S18NBU-1

- Cooling Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Piping length: 24.6ft
 - Compressor Freq: Fc

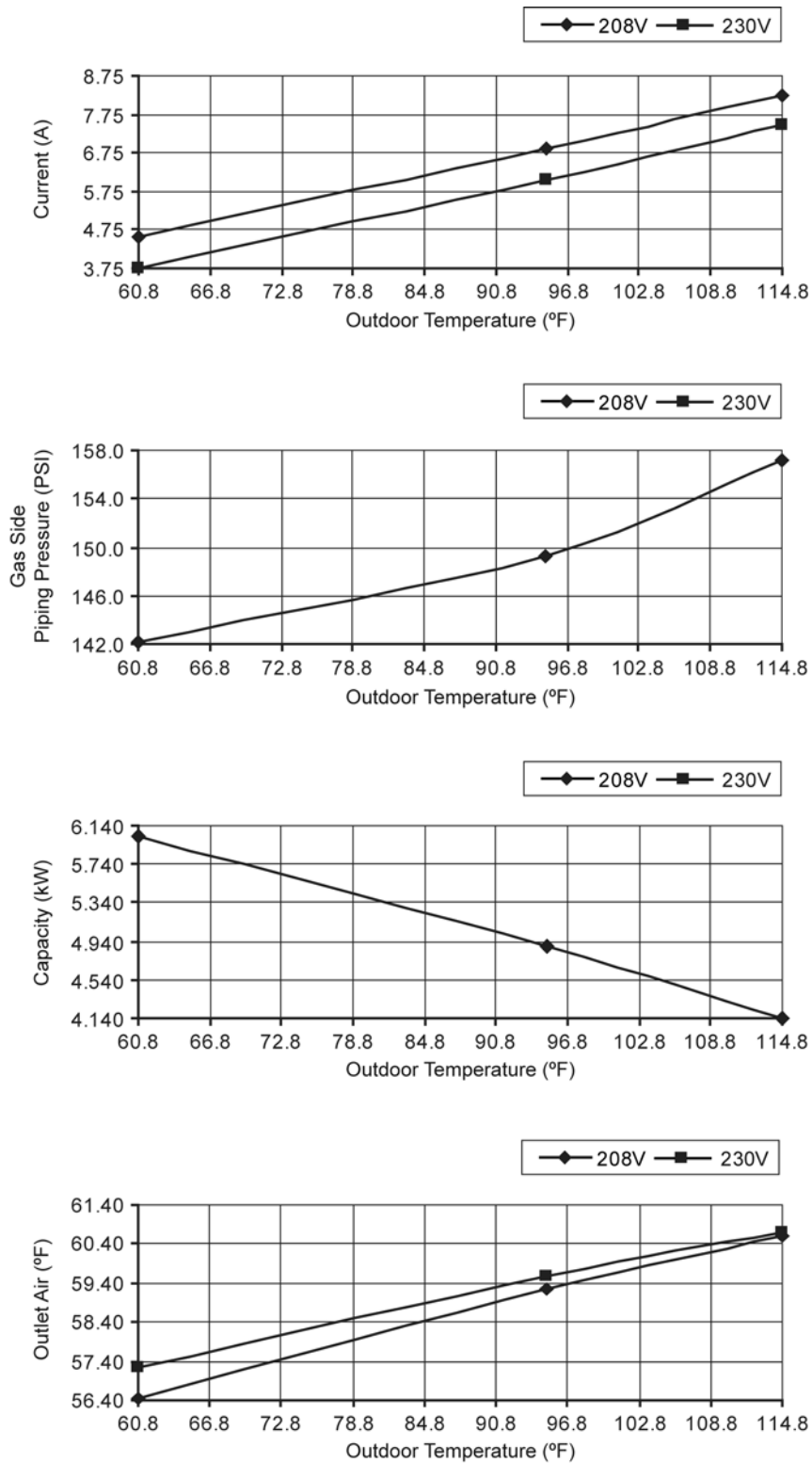


- Piping Length Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Outdoor temperature: 95°F (DBT)
 - Compressor Freq: Fc

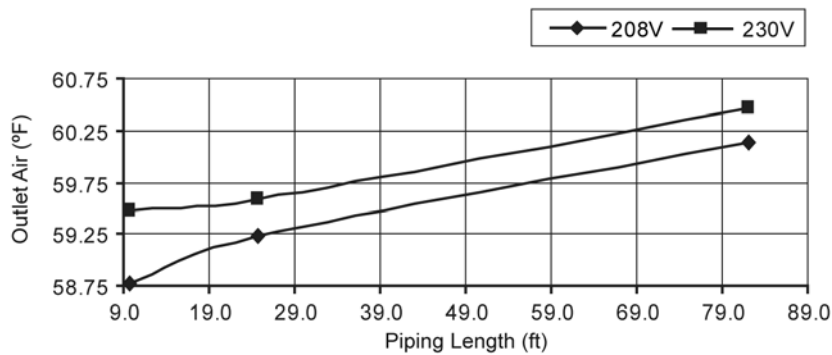
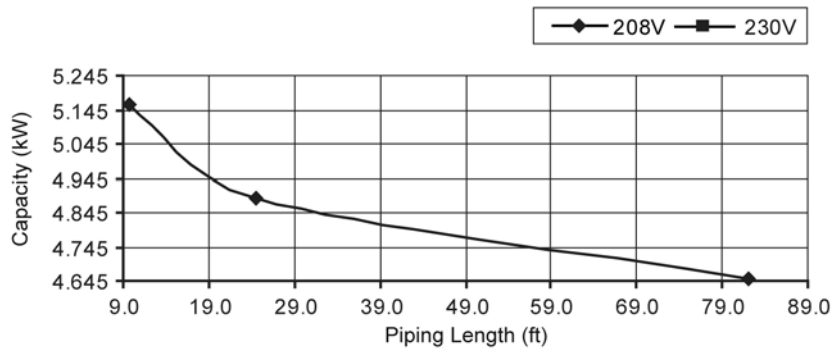
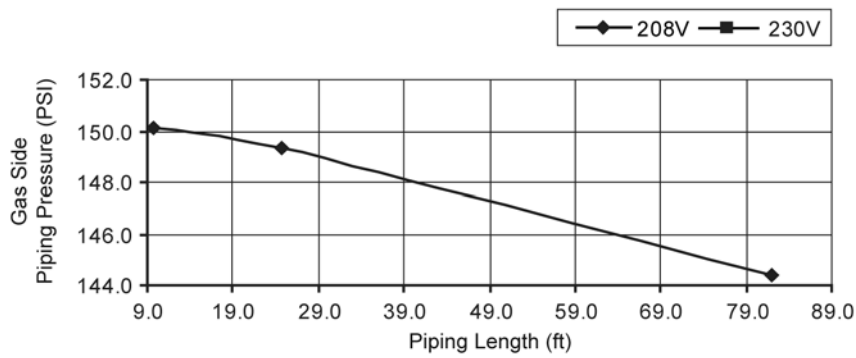
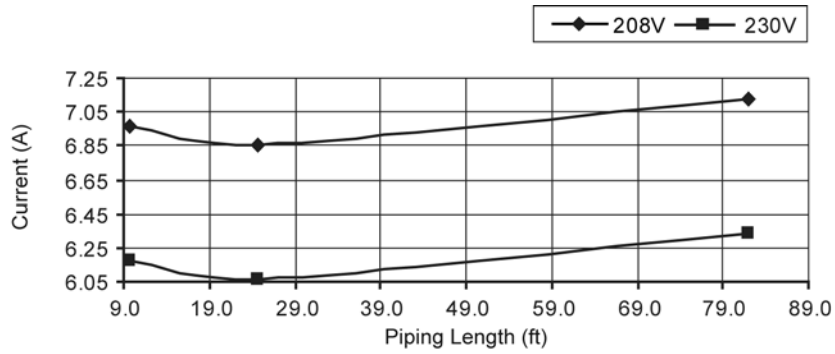


16.1.5 CS-S12NKUW-1+CS-S9NKUW-1 CU-2S18NBU-1

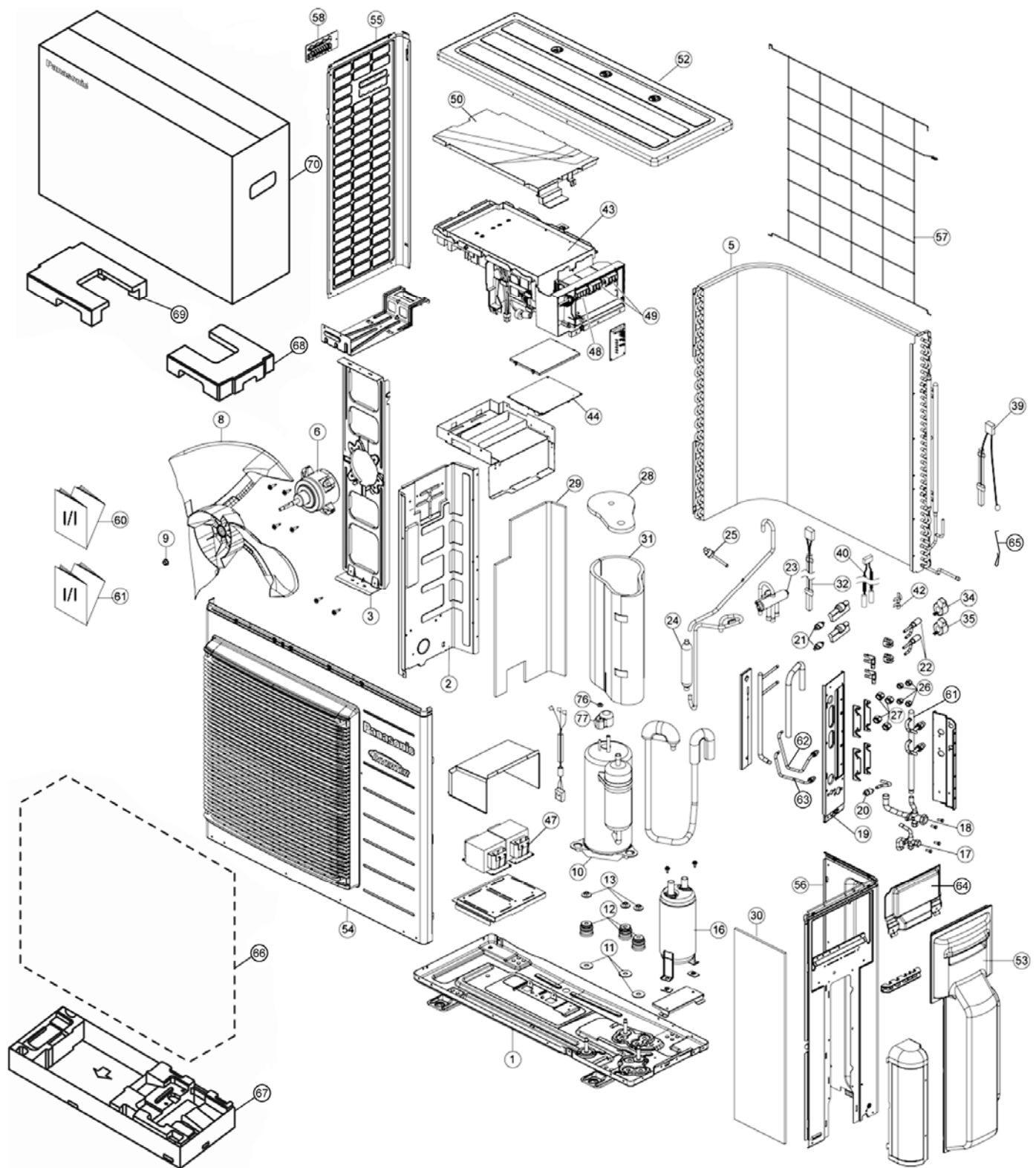
- Cooling Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Piping length: 24.6ft
 - Compressor Freq: Fc



- Piping Length Characteristic
 - Room temperature: 81°F (DBT), 66°F (WBT)
 - Operation condition: High fan speed
 - Outdoor temperature: 95°F (DBT)
 - Compressor Freq: Fc



17. Exploded View and Replacement Parts List



Note

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

REF. NO.	DESCRIPTION & NAME	QTY.	CU-2S18NBU-1	REMARK
1	BASE PAN ASS'Y	1	CWD52K1240A	
2	SOUND-PROOF BOARD	1	CWH151230	
3	FAN MOTOR BRACKET	1	CWD541127	
5	CONDENSER COMPLETE	1	CWB32C2925	
6	FAN MOTOR	1	EHDS80CAC	O
8	PROPELLER FAN	1	CWH00K1006	
9	NUT - PROPELLER FAN	1	CWH561038J	
10	COMPRESSOR	1	5KD184XAB21	
11	PACKING	3	CWB81043	
12	ANTI - VIBRATION BUSHING	3	CWH50055	
13	NUT - COMPRESSOR	3	CWH561049	
16	ACUMULATOR	1	CWB131050	
17	3-WAY VALVE (LIQUID)	2	CWB011601	O
18	3-WAY VALVE(GAS)	2	CWB011602	O
19	HOLDER COUPLING	1	CWH351170	
20	STRAINER	1	CWB111062	
21	STRAINER	2	CWB111063	
22	EXPANSION VALVE	2	CWB051029	
23	4-WAYS VALVE	1	CWB001057	
24	DISCHARGE MUFFLER	1	CWB121042	
25	PRESSURE SWITCH	1	CWA101007	
26	UNION NUT	4	CWT251030	
27	UNION NUT	4	CWT251031	
28	SOUND PROOF MATERIAL	1	CWG302246	
29	SOUND PROOF MATERIAL	1	CWG302520	
30	SOUND PROOF MATERIAL	1	CWG302521	
31	SOUND PROOF MATERIAL	1	CWG302522	
32	SENSOR-COMPLETE	1	CWA50C2722	O
34	V-COIL COMPLETE	1	CWA43C2381	O
35	V-COIL COMPLETE	1	CWA43C2382	O
39	SENSOR-COMPLETE	1	CWA50C2710	O
40	SENSOR-COMPLETE	1	CWA50C2691	O
42	HOLDER-SENSOR	1	CWH32074	
43	ELECTRONIC CONTROLLER-MAIN	1	CWA73C6132R	O
44	ELECTRONIC CONT.-NOISE FILTER	1	CWA745975	O
47	REACTOR	1	G0C403J00001	O
48	TERMINAL BOARD ASS'Y	1	CWA28K1195	O
49	TERMINAL BOARD ASS'Y	2	CWA28K1196	O
50	CONTROL BOARD COVER(TOP)	1	CWH131333	
52	CABINET TOP PLATE	1	CWE031131A	
53	CONTROL BOARD COVER COMPLETE	1	CWH13C1209	
54	CABINET FRONT PLATE CO.	1	CWE06K1071	
55	CABINET SIDE PLATE(L)	1	CWE041489A	
56	CABINET SIDE PLATE(R)	1	CWE041499A	
57	WIRE NET	1	CWD041128A	
58	HANDLE	1	CWE161010	
60	INSTALLATION INSTRUCTION	1	CWF615180	
61	MANIFOLD TUBE ASS'Y(GAS)	1	CWT07K1522	
62	TUBE ASS'Y (LIQUID 1)	1	CWT026316	
63	TUBE ASS'Y (LIQUID 2)	1	CWT026872	
64	CONTROL BOARD COVER	1	CWH131364	
65	CLIP FOR SENSOR HOLDER	3	CWH711010	
66	BAG	1	CWG861154	
67	BASE BOARD-COMPLETE	1	CWG62C1081	
68	SHOCK ABSORBER (RIGHT)	1	CWG712879	

REF. NO.	DESCRIPTION & NAME	QTY.	CU-2S18NBU-1	REMARK
69	SHOCK ABSORBER (LEFT)	1	CWG712880	
70	C.C.CASE	1	CWG565609	
76	TERMINAL COVER	1	CWH171035	
77	NUT - TERMINAL COVER	2	CWH7080300J	

(Note)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.